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11 MONO RADIO

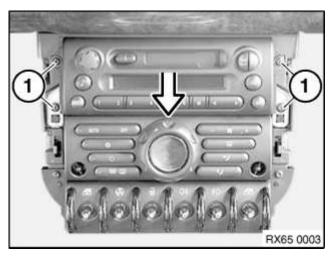
65 11 030 REMOVING AND INSTALLING/REPLACING RADIO RECEIVER (BUILT-IN UNIT)

Necessary preliminary tasks:

• Remove <u>cover strips for front center console</u>

Release screws (1) and pull radio receiver back.

Remove holder (1) for radio wiring harness.



<u>Fig. 1: Radio Receiver Mounting Screws And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (2) and disconnect.

Disconnect antenna plug (3) and remove radio receiver.

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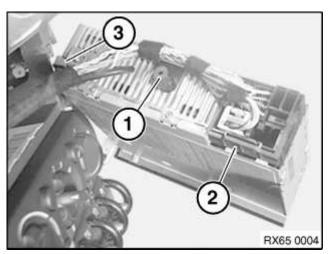


Fig. 2: Radio Receiver Holder, Plug Connection And Antenna Plug Courtesy of BMW OF NORTH AMERICA, INC.

65 11 070 REMOVING AND INSTALLING/REPLACING CD CHANGER

Necessary preliminary tasks:

• Remove Panel For Parcel Shelf.

Release screw (1).

Tilt CD changer (2) inwards and feed out towards front.

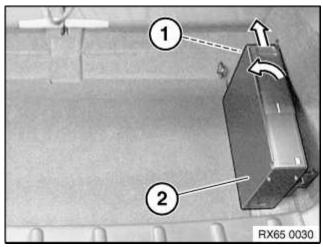
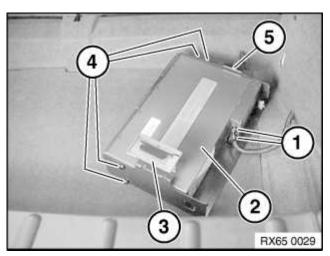


Fig. 3: CD Changer, Mounting Screw And Removal Directions Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Remove CD changer (2).

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<u>Fig. 4: Plug Connections, CD Changer, Trim, Mounting Screws And Changer Bracket</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove CD changer trim (3).

Release screws (4) and remove CD changer (2) from CD changer bracket (5).

65 11 072 REMOVING AND INSTALLING/REPLACING CD CHANGER

NOTE: Follow <u>Instructions For Handling Optical Fibres.</u>

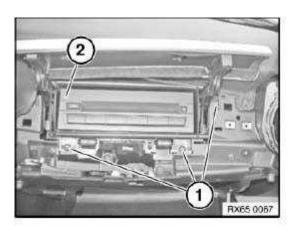
Necessary preliminary tasks:

- Disconnect **Battery Negative Lead**
- Remove Knee Protection, Passenger's Side

Release screws (1).

Remove CD changer (2) with carrier and disconnect associated plug connection.

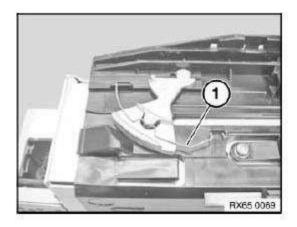
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<u>Fig. 5: Retaining Screws And CD Changer</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure retainer (1) is correctly seated.



<u>Fig. 6: CD Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screw (1) on both sides and slide CD changer (2) out of carrier.

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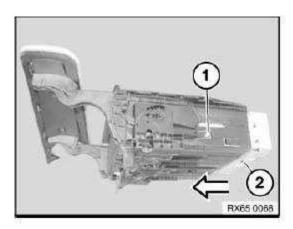


Fig. 7: Mounting Screw, CD Changer And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

65 11 080 REMOVING AND INSTALLING/REPLACING RADIO RECEIVER

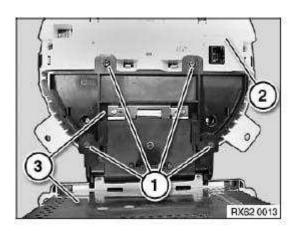
IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

Necessary preliminary tasks:

- Disconnect **Battery Negative Lead**
- Remove Complete Instrument Cluster

Release screws (1).

Remove speedometer (2) from radio (3).



<u>Fig. 8: Screws, Radio And Speedometer</u> Courtesy of BMW OF NORTH AMERICA, INC.

12 STEREO RADIO, AMPLIFIER

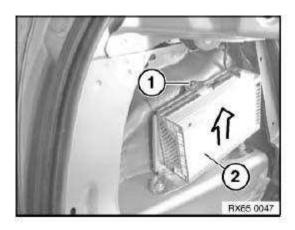
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65 12 072 REMOVING AND INSTALLING/REPLACING AMPLIFIER

Necessary preliminary tasks:

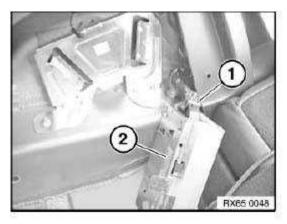
- Disconnect **Battery Negative Lead**
- Remove Left Luggage Compartment Wheel Arch Trim

Release screw (1) and slide amplifier (2) upwards in direction of arrow.



<u>Fig. 9: Retaining Screw, Amplifier And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove amplifier (2).



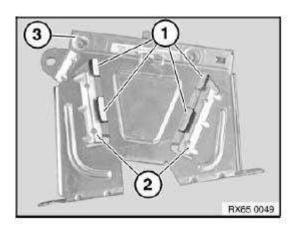
<u>Fig. 10: Plug Connection And Amplifier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lugs (1) must be correctly slid into guide (2).

Check that amplifier (3) is securely seated.

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<u>Fig. 11: Guide, Lugs And Amplifier</u> Courtesy of BMW OF NORTH AMERICA, INC.

13 SPEAKER AND COVER

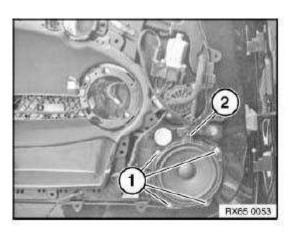
65 13 040 REMOVING AND INSTALLING/REPLACING SPEAKER (WOOFER IN FRONT DOOR)

Necessary preliminary tasks:

• Remove Front Door Trim

Release screws (1).

Disconnect plug connection (2) and remove speaker.



<u>Fig. 12: Screws And Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

65 13 050 REMOVING AND INSTALLING/REPLACING SPEAKER (TWEETER IN A-PILLAR TRIM)

Necessary preliminary tasks:

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• Remove Panel For Roof Pillar At Front

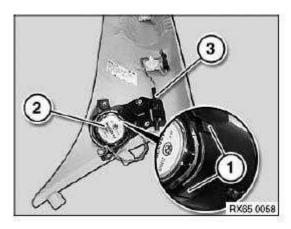
Carefully unclip catches (1).

Remove speaker (2) and feed out electric lead (3).

Installation:

All catches (1) must not be damaged

If necessary, accompanying seal must not be missing!



<u>Fig. 13: Electric Lead, Catches And Speaker</u> Courtesy of BMW OF NORTH AMERICA, INC.

65 13 070 REMOVING AND INSTALLING/REPLACING SPEAKER (MID-RANGE SPEAKER IN FRONT DOOR)

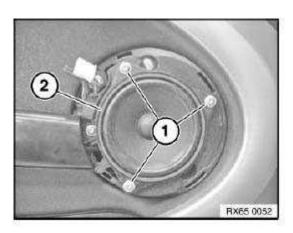
Necessary preliminary tasks:

• Remove **Speaker Trim**

Release screws (1) and remove speaker (2).

Disconnect associated plug connection.

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<u>Fig. 14: Mounting Screws And Speaker</u> Courtesy of BMW OF NORTH AMERICA, INC.

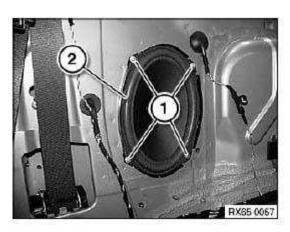
65 13 080 REMOVING AND INSTALLING/REPLACING SPEAKER (REAR MID-RANGE SPEAKER)

Necessary preliminary tasks:

• Remove Rear Side Trim Panel

Release screws (1).

Remove speaker (2) and disconnect associated plug connection.



<u>Fig. 15: Mounting Screws And Speaker</u> Courtesy of BMW OF NORTH AMERICA, INC.

65 13 090 REMOVING AND INSTALLING/REPLACING SPEAKER (TWEETER IN SIDE TRIM PANEL)

Necessary preliminary tasks:

• Remove Rear Side Trim Panel

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Carefully unclip catches (1) and remove speaker (2).

Installation:

All catches (1) must not be damaged

If necessary, accompanying seal must not be missing!

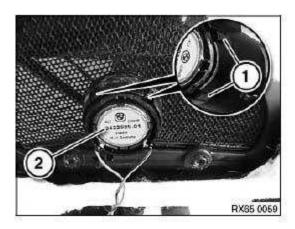


Fig. 16: Catches And Speaker Courtesy of BMW OF NORTH AMERICA, INC.

20 AERIAL/ANTENNA

65 20 010 REMOVING AND INSTALLING/REPLACING ANTENNA ROD OF ROOF ANTENNA

Unscrew antenna rod in counterclockwise direction from antenna base and remove.

65 20 022 REMOVING AND INSTALLING/REPLACING ROOF MOUNTED AERIAL/ANTENNA

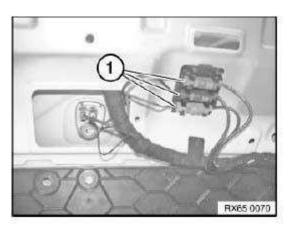
IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

Necessary preliminary tasks:

• Lower **Roofliner**

Disconnect plug connection (1).

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<u>Fig. 17: Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release retainer (2) and feed out roof antenna with leads towards top.

For tightening torque refer to 65 20 1AZ in 65 20 ROOF ANTENNA.

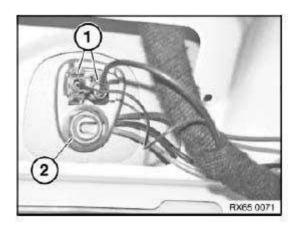


Fig. 18: Plug Connection And Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Roof antenna shown removed for purposes of clarity.

Installation:

Ensure correct cable routing.

Feed antenna leads (1) through groove (2).

Tab (3) when installed secures antenna leads.

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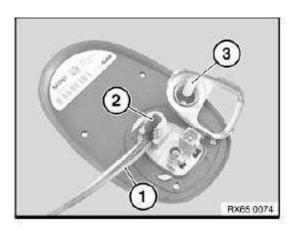


Fig. 19: Tab, Antenna Leads And Groove Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure guide (1) is correctly seated in roof opening (2).

Seal (3) must not be damaged.

Align roof antenna to car longitudinal axis.

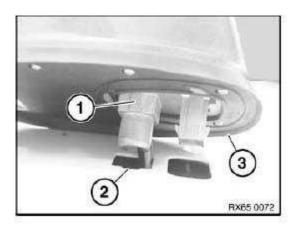


Fig. 20: Roof Opening, Guide And Seal Courtesy of BMW OF NORTH AMERICA, INC.

65 20 090 REMOVING AND INSTALLING OR REPLACING AERIAL AMPLIFIER

Necessary preliminary tasks:

• Remove <u>Trim For Rear Lid At Bottom</u>

Disconnect plug connection (1, 2).

Release screws (3) and remove aerial/antenna amplifier (4).

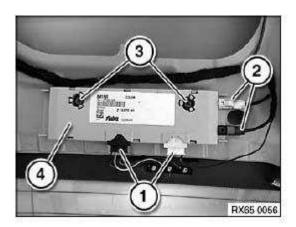


Fig. 21: Plug Connections, Mounting Screws And Aerial/Antenna Amplifier Courtesy of BMW OF NORTH AMERICA, INC.

24 REAR WINDOW AERIAL/ANTENNA

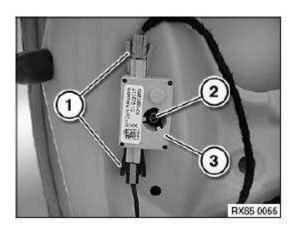
65 24 020 REMOVING AND INSTALLING/REPLACING BLOCKING CIRCUIT

Necessary preliminary tasks:

• Remove Trim For Rear Lid At Bottom

Disconnect plug connections (1) and release screw (2).

Remove blocking circuit (3).



<u>Fig. 22: Mounting Screw, Plug Connections And Blocking Circuit</u> Courtesy of BMW OF NORTH AMERICA, INC.

50 VIDEO AND TV EQUIPMENT

65 50 011 REMOVING AND INSTALLING (REPLACING) VIDEO MODULE FOR ON-BOARD MONITOR

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IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

Necessary preliminary tasks:

- Disconnect **Battery Negative Lead**
- Remove left Front Seat

NOTE: Follow <u>Instructions For Handling Optical Fibres.</u>

Release screws (1) and remove cover (2) in direction of arrow.

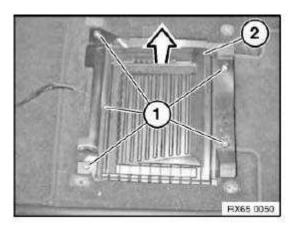


Fig. 23: Retaining Screws, Cover And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unfasten screws (2).

Unlock retaining lug (3) and remove video module (4).

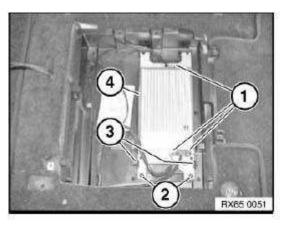


Fig. 24: Plug Connection, Mounting Screws, Retaining Lug And Video Module

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Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **coding/programming**.

65 50 563 REPLACING NAVIGATION DISPLAY

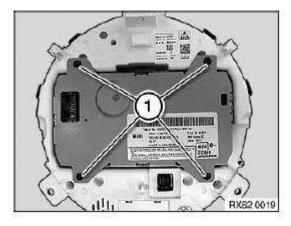
IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection)</u>.

Necessary preliminary tasks:

- Disconnect **Battery Negative Lead**
- Remove Complete Navigation Instrument Cluster

Release screws (1).

Remove navigation display from instrument cluster.



<u>Fig. 25: Navigation Display Mounting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

75 ANTI-THEFT ALARM SYSTEM

65 75 055 REMOVING AND INSTALLING/REPLACING TILT SENSOR FOR ANTI-THEFT ALARM SYSTEM

Necessary preliminary tasks:

• Remove Mounting Bracket For Windscreen Wiper System

Unscrew nuts.

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Remove holder with pitch sensor and disconnect associated plug connection.

Replacement:

Release nut (1) and remove tilt sensor from holder.

Tightening torque for tilt sensor to holder = 7 Nm.

Installation:

Make sure tilt sensor is correctly seated in holder.

65 75 565 REMOVING AND INSTALLING/REPLACING MODULE FOR PASSENGER COMPARTMENT PROTECTION

IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

Necessary preliminary tasks:

• Remove **Roof Operating Unit**

Carefully unclip catches (1) and remove ultrasonic module (2).

Installation:

Catches (1) must not be damaged.

Direction arrow (3) must point in opposite direction to direction of travel.

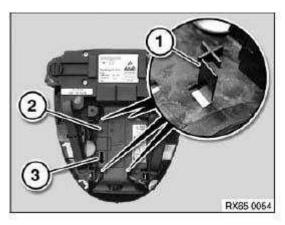


Fig. 26: Ultrasonic Module, Catches And Arrow Courtesy of BMW OF NORTH AMERICA, INC.

77 AIRBAG TRIGGER DEVICE, DIAGNOSTICS

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65 77 ... OVERVIEW OF SENSORS FOR AIRBAG SYSTEM

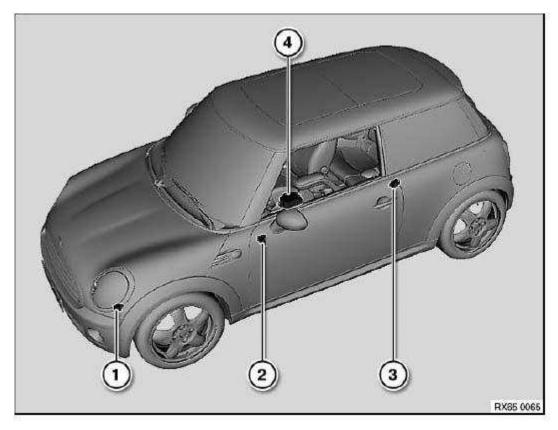


Fig. 27: Airbag System Sensors Overview Courtesy of BMW OF NORTH AMERICA, INC.

- 1. Acceleration sensors, front (left/right, US version only)
- 2. Sensor, front door (left/right, US version only)
- 3. **Sensor, B-pillar** (left/right)
- 4. <u>Airbag control unit</u>(under center console)

65 77 016 REMOVING AND INSTALLING AIRBAG CONTROL UNIT

WARNING: Comply with <u>Airbag Safety Regulations</u>.

Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks:

- Disconnect **Battery Negative Lead**
- Remove **Center Console**

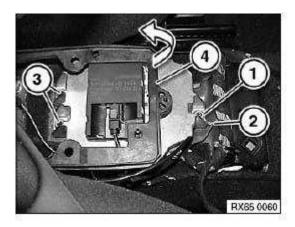
Release nut (1) and disconnect ground cable (2).

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Unscrew nuts (3).

For tightening torque refer to 65 77 1AZ in 65 77 AIRBAG CONTROL UNIT AND AIRBAG SENSORS.

Raise center console bracket (4) in direction of arrow and carefully feed out airbag control unit.



<u>Fig. 28: Ground Cable, Nuts, Centre Console Bracket And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) and remove airbag control unit (2).

Installation:

Make sure cables are correctly laid.

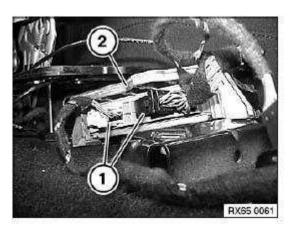


Fig. 29: Plug Connections And Airbag Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

65 77 720 REMOVING AND INSTALLING/REPLACING LEFT/RIGHT B-PILLAR SENSOR

WARNING: Comply with Airbag Safety Regulations.

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Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks:

- Disconnect Battery Negative Lead
- Remove Rear Side Trim Panel

Release bolt (1).

Remove sensor (2) towards bottom and disconnect associated plug connection.

For tightening torque refer to 65 77 3AZ in 65 77 AIRBAG CONTROL UNIT AND AIRBAG SENSORS.

Installation:

Retaining lug (3) must not be damaged.

Make sure sensor (2) is securely seated.



Fig. 30: Retaining Lug, Bolt, B-Pillar Sensor And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

65 77 740 REMOVING AND INSTALLING/REPLACING FRONT LEFT DOOR SENSOR (US VERSION ONLY)

WARNING: Comply with Airbag Safety Regulations.

Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks:

• Remove **Door Trim Panel Carrier**

Release screw.

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For tightening torque refer to 65 77 2AZ in 65 77 AIRBAG CONTROL UNIT AND AIRBAG SENSORS.

Feed out sensor and disconnect plug connection.

Installation:

Make sure sensor is securely seated in door panel.

Sealing ring must not be missing!

81 ON-BOARD COMPUTER

65 81 061 REMOVING AND INSTALLING/REPLACING OUTSIDE-TEMPERATURE SENSOR (WITH A/C SYSTEM)

Necessary preliminary tasks:

• Remove **Bumper Trim**

Disconnect plug connection and unclip outside-temperature sensor.

Installation:

Ensure correct cable routing

83 CAR COMMUNICATION COMPUTER

65 83 010 REMOVING AND INSTALLING/REPLACING CAR COMMUNICATION COMPUTER

IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

NOTE: Comply with notes and <u>Instructions On Handling Optical Waveguides.</u>

Necessary preliminary tasks:

- Disconnect **Battery Negative Lead**
- Remove Centre Console Trim
- Remove Complete Navigation Instrument Cluster

Release screws (1).

IMPORTANT: Do not scratch center console trim, cover if necessary.

Pull back Car Communication Computer (2) slightly.

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Disconnect associated plug connections.

Remove Car Communication Computer (2).

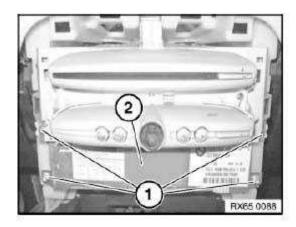


Fig. 31: Mounting Screws And Car Communication Computer Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **coding/programming**.

65 83 550 REMOVING AND INSTALLING/REPLACING FAN FOR CAR COMMUNICATION COMPUTER

IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection)</u>.

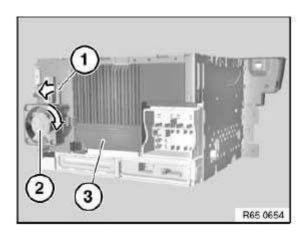
Necessary preliminary tasks:

• Remove <u>Car Communication Computer</u>

Raise retaining hook (1) and turn fan for Car Communication Computer (2) in direction of arrow.

Remove fan for Car Communication Computer (2) from Car Communication Computer (3).

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<u>Fig. 32: Fan, Retaining Hook, Car Communication Computer And Removal Directions</u> Courtesy of BMW OF NORTH AMERICA, INC.

65 83 560 REMOVING AND INSTALLING/REPLACING FRONT TRIM FOR CAR COMMUNICATION COMPUTER

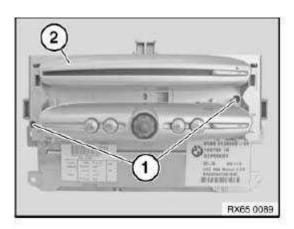
IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

Necessary preliminary tasks:

• Remove Car Communication Computer

Release screws (1).

Fold down front panel for Car Communication Computer (2) upwards and remove.



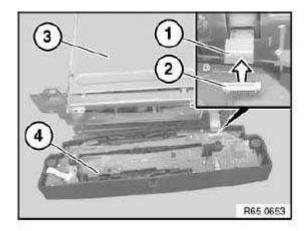
<u>Fig. 33: Mounting Screws And Car Communication Computer</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: "LIF" stands for Low Insert Force.

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Open catch of LIF plug (2) in direction of arrow and feed out LIF cable (1).

Remove front trim for Car Communication Computer (4) from Car Communication Computer (3).



<u>Fig. 34: LIF Cable, LIF Plug, Trim, Communication Computer And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

65 83 570 REMOVING AND INSTALLING/REPLACING CD DRIVE FOR CAR COMMUNICATION COMPUTER

Special tools required:

• 64 1 020

IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

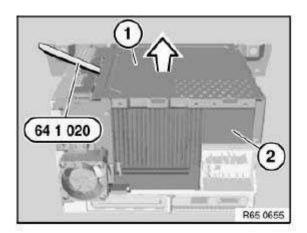
Necessary preliminary tasks:

• Remove Front Trim For Car Communication Computer

If necessary, cut through warranty seal.

Raise cover (1) with special tool 64 1 020 all round and remove from Car Communication Computer (2).

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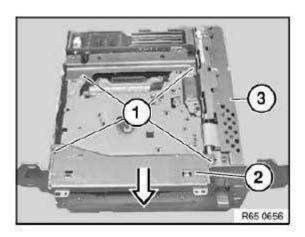
<u>Fig. 35: Cover, Car Communication Computer, Special Tool (64 1 020) And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed CD drive for Car Communication Computer (2) in direction of arrow out of Car Communication Computer (3) and set down.

Installation:

Ensure correct routing of cables.



<u>Fig. 36: Mounting Screw, CD Drive, Car Communication Computer And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove CD drive trim (2) in direction of arrow from CD drive for Car Communication Computer (3).

Installation:

Ensure correct routing of cables.

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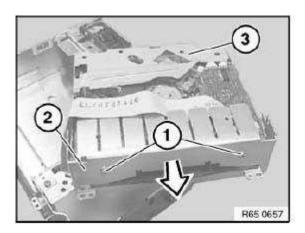


Fig. 37: Mounting Screws, CD Drive Trim, Car Communication Computer And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

Cut through warranty seal (1) at marked point.

Release screw (2).

Lift side cover out of mounting (3) and carefully place to one side.

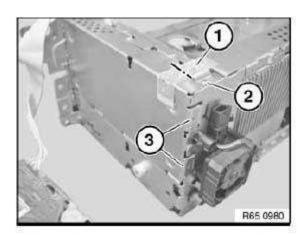


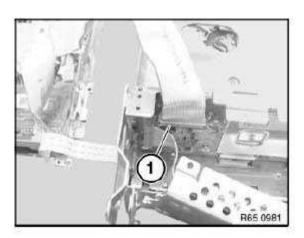
Fig. 38: Warranty Seal, Retaining Screw And Mounting Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove CD drive.

Installation:

Ensure correct routing of cables.

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<u>Fig. 39: CD Drive Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

65 83 580 REMOVING AND INSTALLING/REPLACING DVD DRIVE FOR CAR COMMUNICATION COMPUTER

Special tools required:

- 00 9 450
- 12 7 192
- 64 1 020

IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

Risk of damage!

Place Car Communication Computer on special tool 12 7 192 (antistatic mat) and earth/ground.

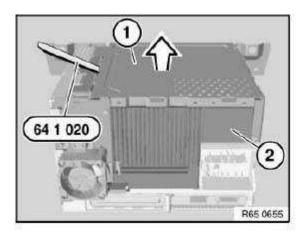
Necessary preliminary tasks:

• Remove front trim for Car Communication Computer

If necessary, cut through warranty seal.

Raise cover (1) with special tool 64 1 020 all round and remove from Car Communication Computer (2).

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<u>Fig. 40: Cover, Car Communication Computer, Special Tool (64 1 020) And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

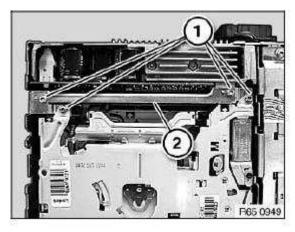
Release screws (1).

Feed out bridge (2).

Installation:

Use special tool 00 9 450 to tighten down screws.

Tightening torque for CD/DVD drive to Car Communication Computer = 0.4 Nm.



<u>Fig. 41: Mounting Screws And Bridge</u> Courtesy of BMW OF NORTH AMERICA, INC.

Cut through stickers at marked points (1).

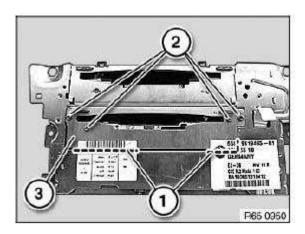
Release screws (2) and remove trim (3).

Installation:

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Use special tool 00 9 450 to tighten down screws.

Tightening torque for CD/DVD drive to Car Communication Computer = 0.4 Nm.



<u>Fig. 42: Marked Points, Screws And Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) with magnetic screwdriver.

Installation:

Lug (2) of DVD drive must be above lug (3) of Car Communication Computer.

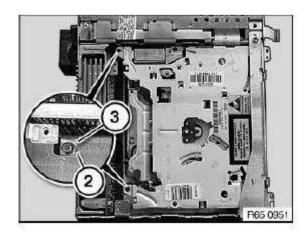


Fig. 43: DVD Drive Screws And Lugs Courtesy of BMW OF NORTH AMERICA, INC.

Turn Car Communication Computer through 180° and carefully feed out DVD drive.

Carefully disconnect plug connections (1, 2).

Remove DVD drive (3).

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Installation:

Ensure correct cable routing.

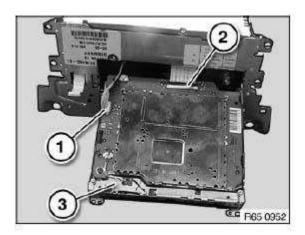


Fig. 44: Plug Connections And DVD Drive Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

On cars manufactured before March 2006 it is essential after replacing the DVD drive to carry out a measures plan or a software update as per **SSS/Progman/CIP**.

65 83 590 REMOVING AND INSTALLING/REPLACING GYRO SENSOR DRIVE FOR CAR COMMUNICATION COMPUTER

IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

Necessary preliminary tasks:

• Remove <u>Car Communication Computer</u>

If necessary, cut through warranty seal.

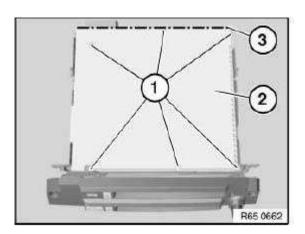
Release screws (1).

Remove floor pan (2) towards bottom and set down.

IMPORTANT: Contact spring strip (3) on floor pan (2) must not be bent: otherwise risk of short-circuiting!

When reinstalling floor pan (2), make sure individual springs of contact spring strip (3) are correctly seated.

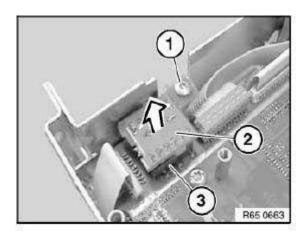
2007 ACCESSORIES & EQUIPMENT Audio, Navigation and Anti-Theft - Repair Instructions - Cooper



<u>Fig. 45: Floor Pam, Screws And Contact Spring Strip</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Detach gyro sensor for Car Communication Computer (2) in direction of arrow from plug-in contact (3).



<u>Fig. 46: Car Communication Computer, Screw, Plug-In Contact And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

65 83 600 REPLACING HIP MODULE FOR CAR COMMUNICATION COMPUTER

IMPORTANT: Read and comply with <u>Notes On Protection Against Electrostatic Damage (ESD Protection).</u>

Necessary preliminary tasks:

• Remove Car Communication Computer

If necessary, cut through warranty seal (1).

Release screw (2).

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Lift HIP module out of mounting (3) and carefully place to one side.

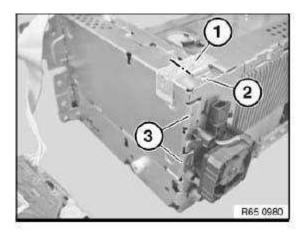


Fig. 47: Warranty Seal, Screw And Mounting Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) in direction of arrow and remove HIP module (2).

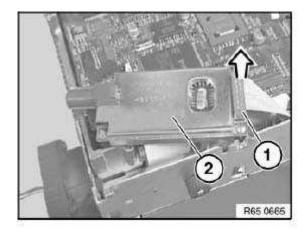


Fig. 48: Removal Direction, Plug Connection And HIP Module Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

• Cars with out-of-date software status at time of repair:

After replacing the HIP module, **program** the Car Communication Computer. Then take the car for an initialization drive.

• Cars with current software status at time of repair:

After replacing the HIP module, take the car for an initialization drive.

Initialization drive:

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Drive for 15-20 minutes at 50 km/h and with good GPS reception until correct vehicle position is achieved in the navigation display.

NOTE: During this time, the position pointer of the navigation system can be motionless or move across country.

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2007 TRANSMISSION

Automatic Transmission - Repair Instructions - Cooper

00 TRANSMISSION ASSEMBLY

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- o Diarrhoea
- o Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

• Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

- Impaired sight
- Irritation of the eyes
- o Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eyerinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: Refer to 00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED

THROUGH THE SKIN and 00 RISK OF INJURY IF OIL COMES INTO

CONTACT WITH EYES AND SKIN.

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

23 .. UNIVERSAL TRANSMISSION BRACKET

Special tools required:

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

- 00 2 030
- 23 4 150

NOTE:

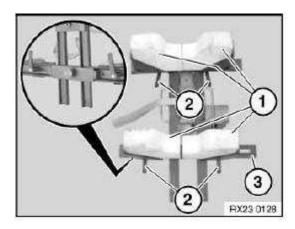
o Suitable for manual and automatic transmissions

IMPORTANT: Supports (1) can be laterally adjusted by means of screws (2).

Carrier (3) of rear supports (1) can be longitudinally adjusted by means of

screw.

Supports must be adapted in length and width to the transmission.



<u>Fig. 1: Identifying Carrier, Rear Supports And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission:

Support transmission with special tools 23 4 150, 00 2 030.

Joint (1) for height adjustment.

Joint (2) for inclination angle adjustment.

IMPORTANT: Transmission *must* be secured with tensioning strap (3).

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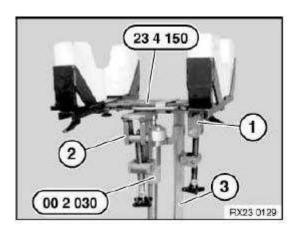
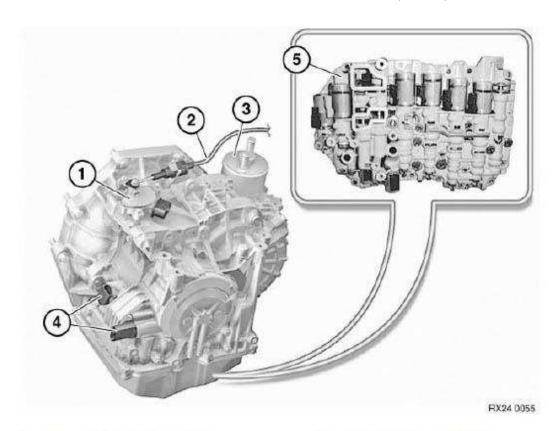


Fig. 2: Identifying Special Tool (23 4 150 & 00 2 030) Courtesy of BMW OF NORTH AMERICA, INC.

24 00 ... OVERVIEW OF TRANSMISSION HOUSING (AISIN)



- 1 Transmission position switch
- 3 Transmission oil cooler
- 5 Hydraulic selector unit

- 2 Bowden cable to selector lever
- 4 Multiple connectors, EGS control unit

Fig. 3: Identifying Transmission Housing Components (Aisin) Courtesy of BMW OF NORTH AMERICA, INC.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

24 00 031 REMOVING AND INSTALLING TRANSMISSION (AISIN)

Special tools required:

- 00 2 030
- 23 4 150

NOTE: After completion of work, check transmission fluid level.

IMPORTANT: Use only the approved automatic transmission fluid in this automatic

transmission.

Failure to comply with this requirement will result in serious damage to the

automatic transmission!

IMPORTANT: An incorrectly adjusted gearshift mechanism can result in gear teeth noises

being transmitted to the passenger compartment.

Adjust selector lever. See **GEAR SHIFT MECHANISM** - REPAIR INSTRUCTIONS

- 2007 HATCHBACK

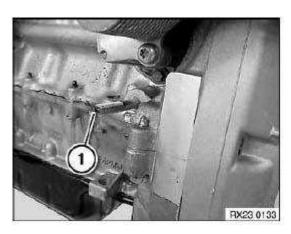
Necessary preliminary tasks:

- Switch off ignition.
- Disconnect battery.
- o Remove air intake filter housing.
- o Remove intake filter housing gaiter.
- Drain coolant.
- o Secure engine in installation position.
- Lower front axle support.
- o Remove catalytic exhaust-gas converter (diesel W16 only)
- o Remove starter.
- o Remove rubber mounts for transmission mounting.
- o Remove left output shaft.
- o Remove right output shaft.

Only on diesel engine (W16)

Remove stud bolt (1) on transmission side for securing catalytic converter.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper



<u>Fig. 4: Identifying Stud Bolt</u> Courtesy of BMW OF NORTH AMERICA, INC.

Only on diesel engine (W16)

Unscrew nut (1).

Release holder (2) from engine.

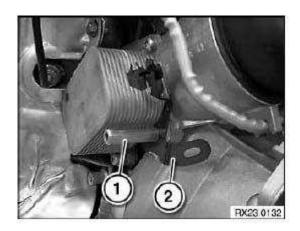


Fig. 5: Identifying Holder And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clips.

Disconnect coolant hoses (1) from oil cooler.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

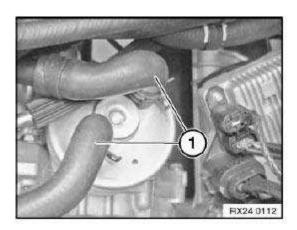


Fig. 6: Identifying Coolant Hoses Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect multiple connectors (1/2) of EGS control unit.

Remove wiring harness.

Pay attention to routing of wiring harness.

NOTE: Illustration similar.

Engine shown removed.

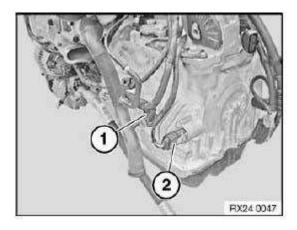


Fig. 7: Identifying Multiple Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable lock nut (1).

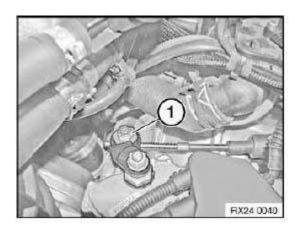
Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Installation:

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

Adjust selector lever

NOTE: Illustration similar.



<u>Fig. 8: Identifying Cable Lock Nut</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug (1) from gear position switch.

Remove hose (2) from holder.

Slide cable locking sleeve (3) in direction of arrow.

Remove cable upwards from holder.

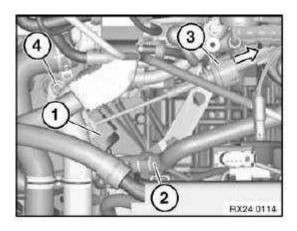


Fig. 9: Identifying Plug, Cable Locking Sleeve And Hose Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission:

Support transmission with special tools 23 4 150 and 00 2 030 .

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Secure transmission with tensioning strap (3).

Tasks are described in **TRANSMISSION BRACKET**.

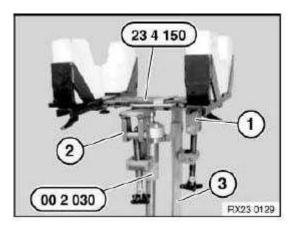


Fig. 10: Identifying Special Tool (23 4 150) And (00 2 030) Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) through opening for starter.

Crank engine further and release remaining 5 nuts.

Bolt connection, converter:

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

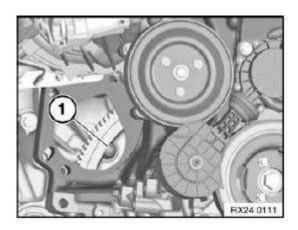


Fig. 11: Identifying Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts and remove transmission.

IMPORTANT: Transmission mounting bolts differ in length.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

Note installation position.

Installing the wrong bolts may cause serious damage.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Installation:

Check that dowel sleeves are correctly seated.

Replace damaged dowel sleeves.

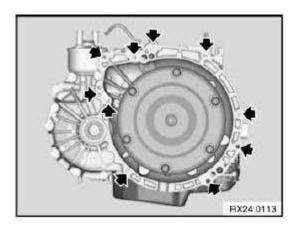


Fig. 12: Locating Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

24 00 051 INSTALLING REPLACEMENT TRANSMISSION (AISIN)

IMPORTANT: Before installing replacement transmission: After completing work:

· Check oil level.

Use only the approved automatic transmission fluid.

- Reset adaptation values.
- Perform clutch and gear ratio adaptation.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Recycling:

Catch and dispose of escaping transmission fluid.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

Observe country-specific waste-disposal regulations

Necessary preliminary tasks:

• Remove automatic transmission.

Convert following parts from previous transmission to new transmission.

- o Converter, transportation lock (1).
- o Holder, shift cable (R56 only)

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

- Bracket with retaining clips for wiring harness
- Transportation plate
- o Transmission carrier with transmission bearing block (not R56)

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

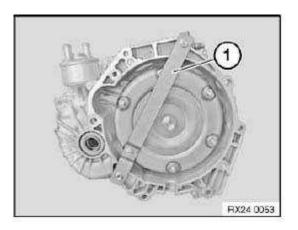


Fig. 13: Identifying Transportation Lock
Courtesy of BMW OF NORTH AMERICA, INC.

11 TRANSMISSION CASE, OIL

23 11 TRANSMISSION DESIGNATIONS

Breakdown of MINI designation:

Manual transmission:

TRANSMISSION DESIGNATIONS CHART

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

GS	5-65 BH/SH		
G	Transmission		
S	Transmission type	 S = Manual transmission A = Automatic transmission 	
5	Number of forward gears		
65			
В	Gear set	 B = Petrol/gasoline gear ratio D = Diesel gear ratio 	
Н	Code letter of transmission manufacturer	 H = Midland G = Getrag Z = ZF (Zahnradfabrik Friedrichshafen) 	

Automatic transmission:

AUTOMATIC TRANSMISSION SPECIFICATION

GACVT 16Z (CVT) Automatic			
G	Transmission		
A	Transmission type	 S = Manual transmission A = Automatic transmission 	
CVT		Electronically controlled continuously variable automatic transmission	
16		Manufacturer's code number	
Z	Code letter of transmission manufacturer	○ Z = ZF (Zahnradfabrik Friedrichshafen)	

TRANSMISSION MANUFACTURER CHART

GA6	GA6F21 WA Automatic			
G	Transmission			
A	Transmission type	 S = Manual transmission A = Automatic transmission 		
6	Number of forward gears			
F21		Manufacturer's code number		
WA	Code letter of transmission manufacturer	o A = AISIN		

Manual transmission:

MANUFACTURER DESIGNATION CHART

MINI designation	Manufacturer	Manufacturer designation	Remark
GS5-65BH	Midland	R65	R50
GS6-85DG	Getrag	G285D	R50

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

GS6-85BG	Getrag	G285	R53
GS5-52BG	Getrag	G252	R50/52
GS6-53BG	Getrag	G253	R56 N14 engine
GS6-55BG	Getrag	G255	R56 N12 engine
GS6-53DG	Getrag	G253	R56 W16 engine

Automatic transmission:

MANUFACTURER DESIGNATION CHART

MINI designation	Manufacturer	Manufacturer designation	Remark
GA CVT 16Z	ZF	ECVT	R52
GA 6F21 WA	AISIN	F21	R52/53

24 11 012 REMOVING AND INSTALLING/SEALING OR REPLACING TRANSMISSION FLUID SUMP (AISIN)

Necessary preliminary tasks:

Secure engine in installation position.

Raise engine and transmission.

NOTE: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

IMPORTANT: Use only the approved automatic transmission fluid in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain fluid before the transmission has cooled down.

Remove underbody protection (1).

Release screw (2).

Drain off transmission fluid.

Unscrew bolt (3).

Drain off transmission fluid.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

Installation:

Replace seals.

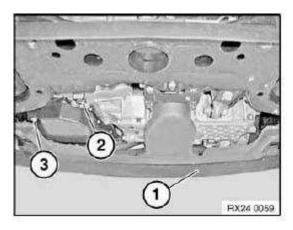


Fig. 14: Identifying Underbody Protection And Screws Courtesy of BMW OF NORTH AMERICA, INC.

Twist sump tube (1) out of transmission fluid sump and drain remaining transmission fluid.

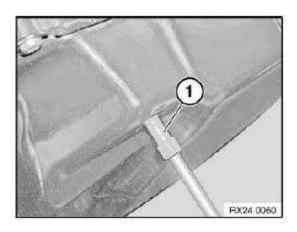


Fig. 15: Identifying Sump Tube Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt with Torx head (1).

Remove remaining mounting bolts from transmission fluid sump and remove sump.

Remove sump gasket.

Clean sealing surfaces.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

Installation:

Clean gasket.

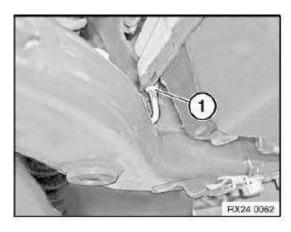


Fig. 16: Locating Torx Head Bolt Courtesy of BMW OF NORTH AMERICA, INC.

Clean sump magnets (1) and insert in new transmission fluid sump.

Screw sump tube (2) at distance (A)

R25/R53: 50.05-50.75 mm

R56: 37.35-38.05 mm into new transmission oil sump.

Fit oil drain plug with new seal.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> **HATCHBACK**.

IMPORTANT: Do not tighten sump tube too tightly.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

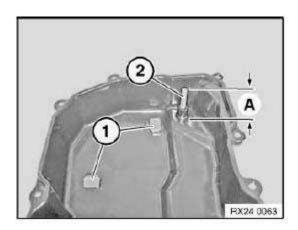


Fig. 17: Identifying Sump Magnets And Sump Tube Courtesy of BMW OF NORTH AMERICA, INC.

24 11 040 REMOVING AND INSTALLING/REPLACING TRANSMISSION FLUID COOLER (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Use only the approved transmission fluid.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: No dirt is allowed to enter the oil circuit.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Drain coolant
- Remove intake filter housing
- o Remove intake filter housing gaiter.

Unfasten hose clips.

Detach coolant hoses (1) from transmission fluid cooler.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

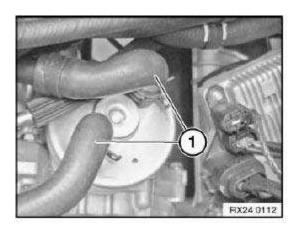


Fig. 18: Identifying Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Installation:

Pay attention to position lug (2).

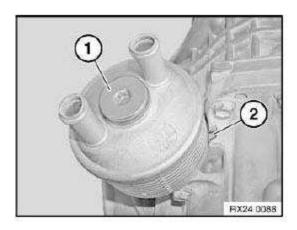


Fig. 19: Identifying Lug And Screw Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing ring (1).

Installation:

Clean contact surfaces.

Moisten sealing ring (1) with clean transmission fluid.

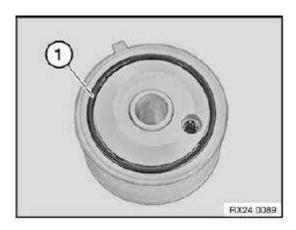


Fig. 20: Identifying Sealing Ring Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing ring (1).

Installation:

Clean contact surfaces.

Moisten sealing ring (1) with clean transmission fluid.

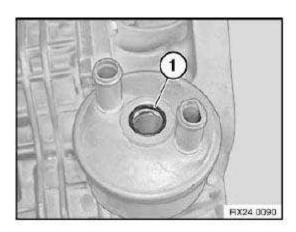


Fig. 21: Identifying Sealing Ring Courtesy of BMW OF NORTH AMERICA, INC.

24 11 170 REPLACING TRANSMISSION BREATHER

IMPORTANT:

- o Check breather for completeness after removal.
- Broken-off breather retaining lugs will result in serious damage to and failure of the automatic transmission.

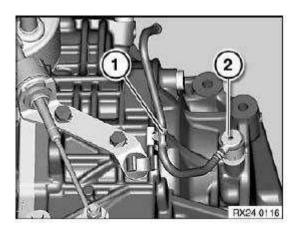
Necessary preliminary tasks:

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

Remove rubber mounts for transmission mounting.

Remove hose from holder (1).

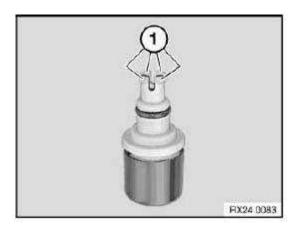
Lever breather (2) out of transmission case with a suitable tool.



<u>Fig. 22: Identifying Holder And Breather</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check breather for completeness.

Retaining lugs (1) must not be broken off and be left behind in the transmission.



<u>Fig. 23: Identifying Lugs</u> Courtesy of BMW OF NORTH AMERICA, INC.

24 21 515 REPLACING RADIAL SHAFT SEAL FOR DRIVE SHAFT (AISIN)

Special tools required:

- 00 5 010
- 24 4 250

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NOTE: Transmission removed!

Remove torque converter.

Pull off radial shaft seal with special tool 00 5 010.

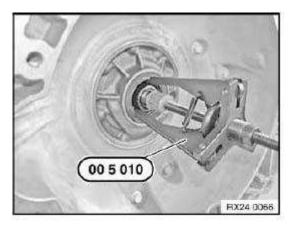


Fig. 24: Identifying Special Tool (00 5 010) Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surface.

Lubricate sealing lip of shaft seal with clean transmission oil.

Push radial shaft seal (1) onto special tool 24 4 250 and drive firmly home.

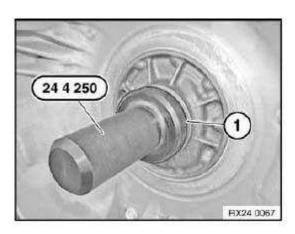


Fig. 25: Identifying Special Tool (24 4 250)
Courtesy of BMW OF NORTH AMERICA, INC.

24 30 010 REMOVING AND INSTALLING/REPLACING HYDRAULIC SELECTOR UNIT (AISIN)

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

IMPORTANT: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

IMPORTANT: Use only the approved automatic transmission fluid in this automatic

transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain fluid before the transmission has cooled down.

Necessary preliminary tasks:

• Remove 24 11 012 REMOVING AND INSTALLING/SEALING OR REPLACING TRANSMISSION FLUID SUMP (AISIN).

• Remove 24 31 151 REMOVING AND INSTALLING/REPLACING TRANSMISSION FLUID STRAINER (AISIN).

Bend open retaining lugs (1) of hand valve lever.

Slacken nut (2).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Remove hand valve lever (3).

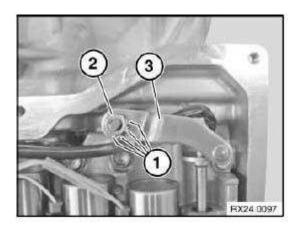


Fig. 26: Identifying Retaining Lugs, Slacken Nut And Valve Lever Courtesy of BMW OF NORTH AMERICA, INC.

Release plugs (1/2) from holders and disconnect.

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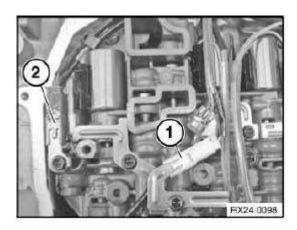


Fig. 27: Identifying Plugs Courtesy of BMW OF NORTH AMERICA, INC.

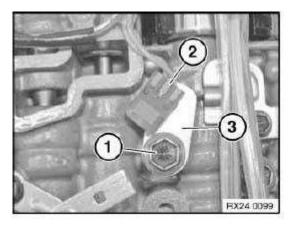
Release screw (1).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Remove oil temperature sensor (2) with locking plate (3).

Installation:

Moisten seal with ATF.



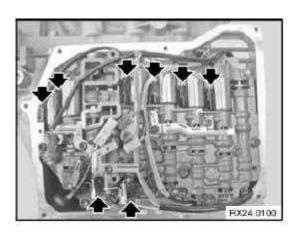
<u>Fig. 28: Identifying Oil Temperature Sensor And Locking Plate</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plugs of magnet and pressure valves.

Installation:

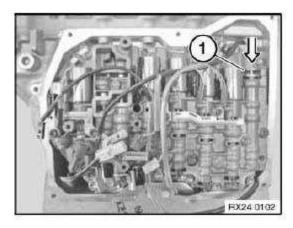
Pay attention to routing of cables.

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<u>Fig. 29: Locating Plugs Of Magnet And Pressure Valves</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When removing selector unit, slide in selector slide (1) and hold down.



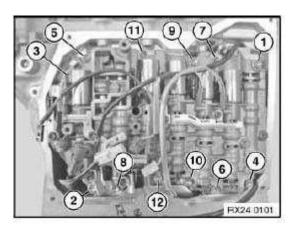
<u>Fig. 30: Identifying Selector Slide</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screws have different lengths.

Numbers: 4,6,10,12=28 mm. Numbers: 2,3,5,7,8,11=21 mm.

Numbers: 1,9=16 mm.

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<u>Fig. 31: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

First release screws uniformly in specified order and then remove.

Remove selector unit. Refer to <u>24 30 010 REMOVING AND INSTALLING/REPLACING HYDRAULIC SELECTOR UNIT (AISIN)</u>.

Installation:

Pay attention to installation location of cable holders and cables.

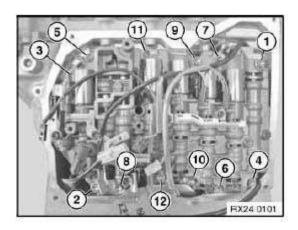


Fig. 32: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Under the selector unit at the end of the selector slide is the accumulator plunger (1) with spring.

Hold accumulator plunger (1) and spring firmly when removing selector unit.

Installation:

Moisten accumulator plunger and spring with ATF.

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Install selector unit, accumulator plunger and spring simultaneously.

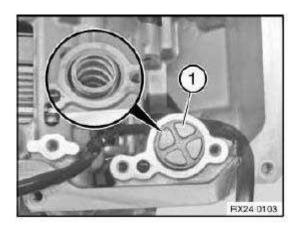


Fig. 33: Identifying Accumulator Plunger Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before installing selector unit, secure cable with adhesive tape in installation location on housing.

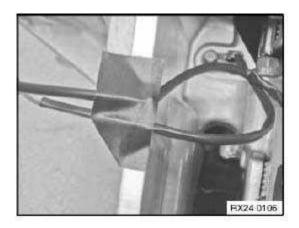


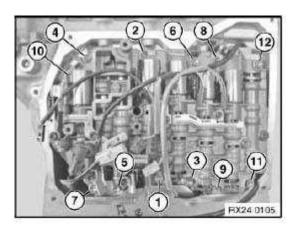
Fig. 34: Identifying Cable With Adhesive Tape Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Insert screws slightly during installation, align selector unit and tighten down in specified order.

Jointing torque and angle of rotation must be observed.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

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<u>Fig. 35: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

24 35 508 REPLACING WIRING HARNESS IN AUTOMATIC TRANSMISSION (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

IMPORTANT: Use only the approved automatic transmission fluid in this automatic

transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain fluid before the transmission has cooled down.

Necessary preliminary tasks:

• Remove hydraulic selector unit. Refer to <u>24 30 010 REMOVING AND INSTALLING/REPLACING</u> HYDRAULIC SELECTOR UNIT (AISIN).

Release screw (1).

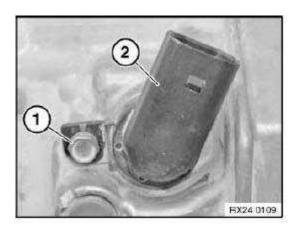
Disconnect multiple connector (2) of EGS control unit.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

Installation:

Coat O-ring with ATF.

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<u>Fig. 36: Identifying Screws And Multiple Connector</u> Courtesy of BMW OF NORTH AMERICA, INC.

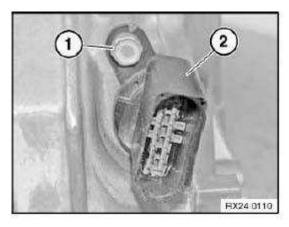
Release screw (1).

Disconnect multiple connector (2) of EGS control unit.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Installation:

Coat O-ring with ATF.



<u>Fig. 37: Identifying Multiple Connector And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

24 35 560 REPLACING SPEED SENSOR (OUTPUT) (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

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IMPORTANT: Use only the approved automatic transmission fluid in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain fluid before the transmission has cooled down.

Necessary preliminary tasks:

o Remove hydraulic selector unit. Refer to <u>24 30 010 REMOVING AND INSTALLING/REPLACING</u> HYDRAULIC SELECTOR UNIT (AISIN).

Release screw (1).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

Remove sensor (2).

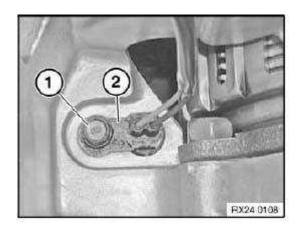


Fig. 38: Identifying Sensor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

24 35 565 REPLACING SPEED SENSOR (INPUT) (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

IMPORTANT: Use only the approved automatic transmission fluid in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain fluid before the transmission has cooled down.

Necessary preliminary tasks:

o Remove hydraulic selector unit. Refer to 24 30 010 REMOVING AND INSTALLING/REPLACING

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HYDRAULIC SELECTOR UNIT (AISIN).

Release screw (1).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Remove sensor (2).

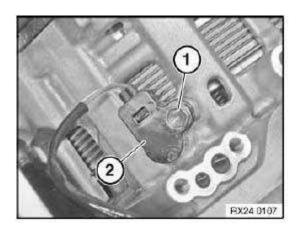


Fig. 39: Identifying Sensor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

12 TORQUE CONVERTER BEARING

24 12 110 REMOVING AND INSTALLING/REPLACING SELECTOR SHAFT RADIAL SEAL (AISIN)

Special tools required:

- 24 4 280
- 24 4 290

Necessary preliminary tasks:

• Remove gear position switch

Screw special tool 24 4 280 firmly into radial shaft seal.

Pull seal out of transmission case by means of bolt (1).

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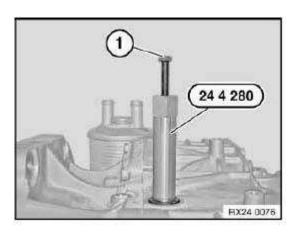


Fig. 40: Identifying Special Tool (24 4 280) Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with clean transmission oil.

Drive shaft seal firmly home with special tool 24 4 290.

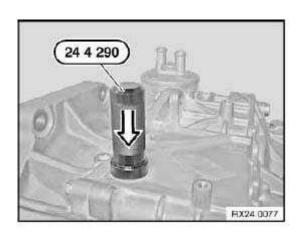


Fig. 41: Identifying Special Tool (24 4 290) Courtesy of BMW OF NORTH AMERICA, INC.

15 ELECTRICAL ATTACHMENTS

24 10 006 REMOVING AND INSTALLING/REPLACING GEAR POSITION SWITCH (AISIN)

Special tools required:

• 24 4 270

IMPORTANT: An incorrectly adjusted gearshift mechanism can result in gear teeth noises.

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Necessary preliminary tasks:

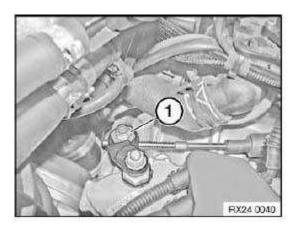
- Remove intake filter housing
- Remove intake filter housing gaiter.

Release cable lock nut (1).

Installation:

Adjust gearshift mechanism.

NOTE: Illustration similar.



<u>Fig. 42: Identifying Cable Lock Nut</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug (1) from gear position switch.

Unlock locking sleeve (3) in direction of arrow.

Remove cable upwards from holder.

Release nut (4) and remove selector lever.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

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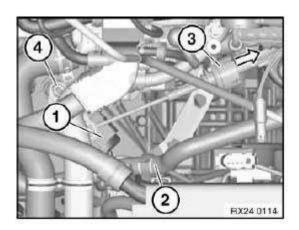


Fig. 43: Identifying Plug, Cable Locking Sleeve And Hose Courtesy of BMW OF NORTH AMERICA, INC.

Release shim (1), retaining ring (2) and nut (3).

Release bolts (4).

Remove switch.

Installation:

Insert screws (4) slightly.

Fit shim, retaining ring and nut.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

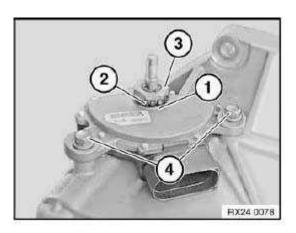


Fig. 44: Identifying Shim, Retaining Ring And Nut Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 24 4 270.

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Tighten screw (1).

Align position switch to "N".

Tighten down screws (2).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Installation:

Connect gear position switch plug

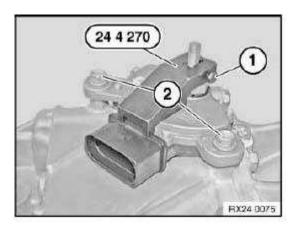


Fig. 45: Identifying Special Tool (24 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

24 10 018 ADJUSTING SELECTOR LEVER (AISIN)

IMPORTANT: An incorrectly adjusted gearshift mechanism can result in gear teeth noises be transmitted into the passenger compartment.

Necessary preliminary tasks:

- Remove suction filter housing.
- Remove intake filter housing gaiter.
- Move selector lever to "P" position.

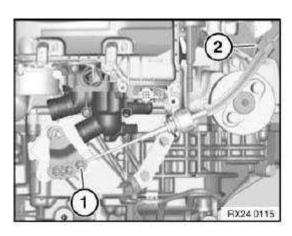
Insert end of shift cable into locating sleeve (1) of selector lever.

Insert shift cable in holder.

Secure shift cable with clip to retaining bracket (2).

Move selector lever to "P" position (in counterclockwise direction).

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<u>Fig. 46: Identifying Sleeve And Bracket</u> Courtesy of BMW OF NORTH AMERICA, INC.

Grip nut (1) and tighten down nut (2).

NOTE: Press against end of shift cable shortly before tightening down screw.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

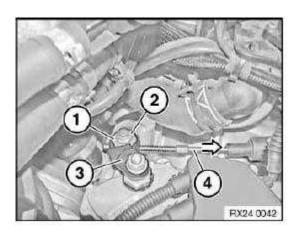


Fig. 47: Identifying Nut Courtesy of BMW OF NORTH AMERICA, INC.

24 12 110 REMOVING AND INSTALLING/REPLACING SELECTOR SHAFT RADIAL SEAL (AISIN)

Special tools required:

- 24 4 280
- 24 4 290

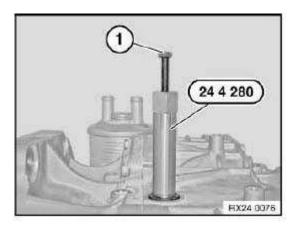
Necessary preliminary tasks:

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

• Remove gear position switch

Screw special tool 24 4 280 firmly into radial shaft seal.

Pull seal out of transmission case by means of bolt (1).



<u>Fig. 48: Identifying Special Tool (24 4 280)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with clean transmission oil.

Drive shaft seal firmly home with special tool 24 4 290.

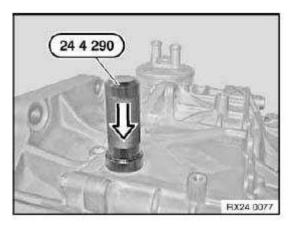


Fig. 49: Identifying Special Tool (24 4 290) Courtesy of BMW OF NORTH AMERICA, INC.

25 1. ... SHIFTLOCK TROUBLESHOOTING (AISIN)

NOTE: Troubleshooting with DIS Tester.

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21 DRIVE-INTERMEDIATE-OUT

24 21 220 REMOVING RADIAL SHAFT SEAL OF LEFT AXLE SHAFT (AISIN)

Special tools required:

- 23 0 490
- 24 4 300

Necessary preliminary tasks:

- Drain off transmission oil.
- Remove FRONT AXLE REPAIR INSTRUCTIONS 2007 HATCHBACK

Drive a hole into radial shaft seal using a center punch.

IMPORTANT: Do not use a drill as drillings may result in transmission malfunction.

Screw special tool 23 0 490 into radial shaft seal (1).

Drive out radial shaft seal (1) with impact weight (2).

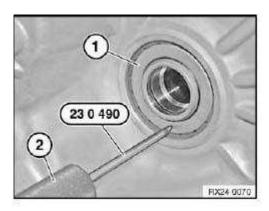


Fig. 50: Identifying Special Tool (23 0 490) Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with clean transmission oil.

Drive shaft seal firmly home with special tool 24 4 300.

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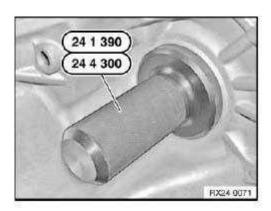


Fig. 51: Identifying Special Tool (24 4 300)
Courtesy of BMW OF NORTH AMERICA, INC.

24 21 230 REMOVING RADIAL SHAFT SEAL OF RIGHT AXLE SHAFT (AISIN)

Special tools required:

- 23 0 490
- 24 4 300

Necessary preliminary tasks:

- Drain off transmission oil.
- Remove FRONT AXLE REPAIR INSTRUCTIONS 2007 HATCHBACK

Drive a hole into radial shaft seal using a center punch.

IMPORTANT: Do not use a drill as drillings may result in transmission malfunction.

Screw special tool 23 0 490 into radial shaft seal.

Drive out radial shaft seal (1) with impact weight (2).

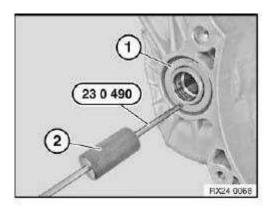


Fig. 52: Identifying Special Tool (23 0 490)

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with clean transmission oil.

Drive radial shaft seal (1) firmly home with special tool 24 4 300.

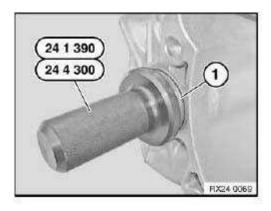


Fig. 53: Identifying Special Tool (24 4 300) Courtesy of BMW OF NORTH AMERICA, INC.

24 21 515 REPLACING RADIAL SHAFT SEAL FOR DRIVE SHAFT (AISIN)

Special tools required:

- 00 5 010
- 24 4 250

NOTE: Transmission removed!

Remove 40 TORQUE CONVERTER.

Pull off radial shaft seal with special tool 00 5 010.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

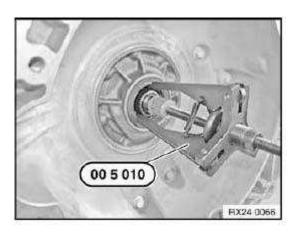


Fig. 54: Identifying Special Tool (00 5 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surface.

Lubricate sealing lip of shaft seal with clean transmission oil.

Push radial shaft seal (1) onto special tool 24 4 250 and drive firmly home.

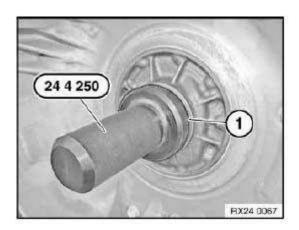


Fig. 55: Identifying Special Tool (24 4 250)
Courtesy of BMW OF NORTH AMERICA, INC.

30 HYDR-EL CONTROL COMPONENT

24 30 010 REMOVING AND INSTALLING/REPLACING HYDRAULIC SELECTOR UNIT (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

IMPORTANT: Use only the approved automatic transmission fluid in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage! Do not drain fluid before the transmission has cooled down.

Necessary preliminary tasks:

- Remove <u>24 11 012 REMOVING AND INSTALLING/SEALING OR REPLACING</u> TRANSMISSION FLUID SUMP (AISIN)
- Remove 24 31 151 REMOVING AND INSTALLING/REPLACING TRANSMISSION FLUID STRAINER (AISIN).

Bend open retaining lugs (1) of hand valve lever.

Slacken nut (2).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

Remove hand valve lever (3).

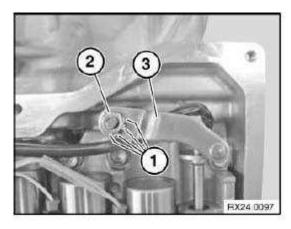


Fig. 56: Identifying Retaining Lugs, Slacken Nut And Valve Lever Courtesy of BMW OF NORTH AMERICA, INC.

Release plugs (1/2) from holders and disconnect.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper

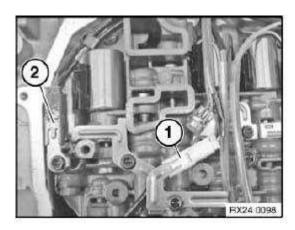


Fig. 57: Identifying Plugs Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Remove oil temperature sensor (2) with locking plate (3).

Installation:

Moisten seal with ATF.

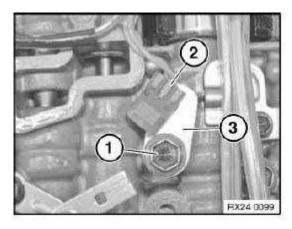


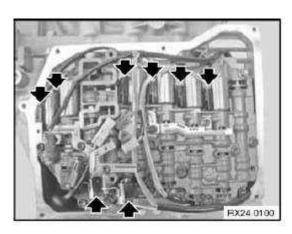
Fig. 58: Identifying Oil Temperature Sensor And Locking Plate Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plugs of magnet and pressure valves.

Installation:

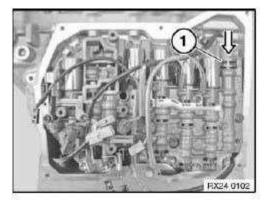
Pay attention to routing of cables.

2007 TRANSMISSION Automatic Transmission - Repair Instructions - Cooper



<u>Fig. 59: Locating Plugs Of Magnet And Pressure Valves</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When removing selector unit, slide in selector slide (1) and hold down.



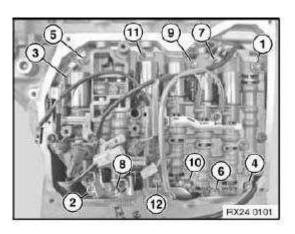
<u>Fig. 60: Identifying Selector Slide</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screws have different lengths.

Numbers: 4,6,10,12=28 mm. Numbers: 2,3,5,7,8,11=21 mm.

Numbers: 1,9=16 mm.

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<u>Fig. 61: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

First release screws uniformly in specified order and then remove.

Remove selector unit. Refer to **24 30 010 REMOVING AND INSTALLING/REPLACING HYDRAULIC SELECTOR UNIT (AISIN)**.

Installation:

Pay attention to installation location of cable holders and cables.

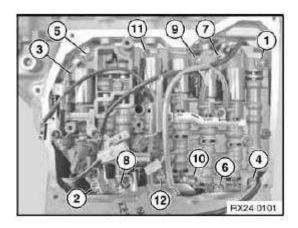


Fig. 62: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Under the selector unit at the end of the selector slide is the accumulator plunger (1) with spring.

Hold accumulator plunger (1) and spring firmly when removing selector unit.

Installation:

Moisten accumulator plunger and spring with ATF.

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Install selector unit, accumulator plunger and spring simultaneously.

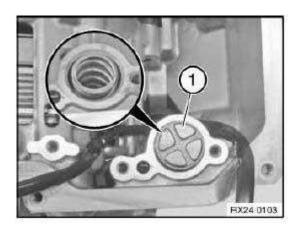


Fig. 63: Identifying Accumulator Plunger Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before installing selector unit, secure cable with adhesive tape in installation location on housing.

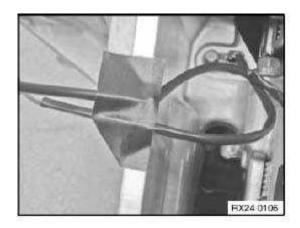


Fig. 64: Identifying Cable With Adhesive Tape Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Insert screws slightly during installation, align selector unit and tighten down in specified order.

Jointing torque and angle of rotation must be observed.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

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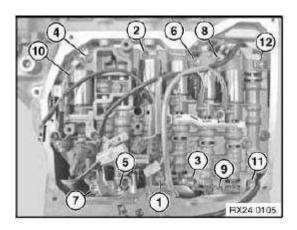


Fig. 65: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

31 PUMP

24 31 151 REMOVING AND INSTALLING/REPLACING TRANSMISSION FLUID STRAINER (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Use only the approved transmission fluid.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

• Remove <u>24 11 012 REMOVING AND INSTALLING/SEALING OR REPLACING TRANSMISSION FLUID SUMP (AISIN).</u>

Release screws (1).

Remove fluid strainer.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

Installation:

Clean contact surfaces.

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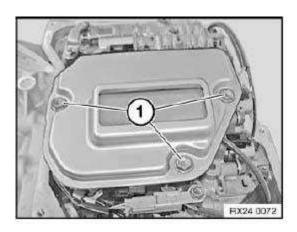


Fig. 66: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

35 WIRING HARNESS, SHIFT

24 35 508 REPLACING WIRING HARNESS IN AUTOMATIC TRANSMISSION (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

IMPORTANT: Use only the approved automatic transmission fluid in this automatic

transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain fluid before the transmission has cooled down.

Necessary preliminary tasks:

o Remove hydraulic selector unit. Refer to <u>24 30 010 REMOVING AND INSTALLING/REPLACING HYDRAULIC SELECTOR UNIT (AISIN)</u>.

Release screw (1).

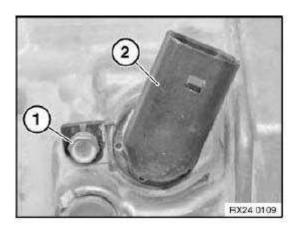
Disconnect multiple connector (2) of EGS control unit.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Installation:

Coat O-ring with ATF.

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<u>Fig. 67: Identifying Screws And Multiple Connector</u> Courtesy of BMW OF NORTH AMERICA, INC.

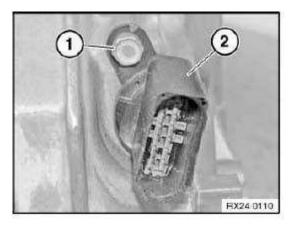
Release screw (1).

Disconnect multiple connector (2) of EGS control unit.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Installation:

Coat O-ring with ATF.



<u>Fig. 68: Identifying Multiple Connector And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

24 35 560 REPLACING SPEED SENSOR (OUTPUT) (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

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IMPORTANT: Use only the approved automatic transmission fluid in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain fluid before the transmission has cooled down.

Necessary preliminary tasks:

o Remove hydraulic selector unit. Refer to <u>24 30 010 REMOVING AND INSTALLING/REPLACING</u> HYDRAULIC SELECTOR UNIT (AISIN).

Release screw (1).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> HATCHBACK.

Remove sensor (2).

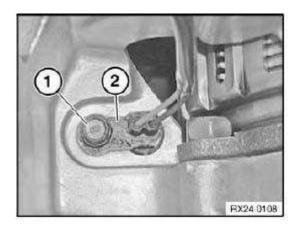


Fig. 69: Identifying Sensor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

24 35 565 REPLACING SPEED SENSOR (INPUT) (AISIN)

IMPORTANT: After completion of work, check transmission fluid level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 liters.

IMPORTANT: Use only the approved automatic transmission fluid in this automatic

transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain fluid before the transmission has cooled down.

Necessary preliminary tasks:

o Remove selector unit. Refer to 24 30 010 REMOVING AND INSTALLING/REPLACING

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HYDRAULIC SELECTOR UNIT (AISIN).

Release screw (1).

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Remove sensor (2).

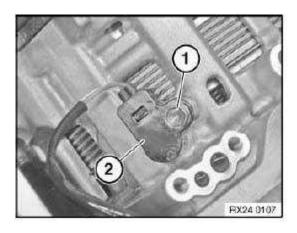


Fig. 70: Identifying Sensor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

40 TORQUE CONVERTER

24 40 012 REMOVING AND INSTALLING / REPLACING TORQUE CONVERTER (AISIN)

Special tools required:

- 00 2 550
- 24 4 260

IMPORTANT: After completion of work, check transmission fluid level.

Use only approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

• Remove automatic transmission. Refer to **00 TRANSMISSION ASSEMBLY**.

Screw special tool 24 4 260 onto torque converter.

Remove torque converter.

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NOTE: Remove torque converter and set down vertically.
When torque converter is removed, transmission oil flows out.

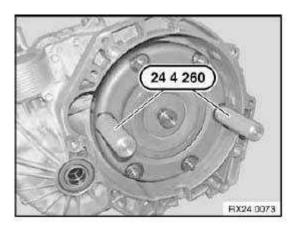


Fig. 71: Identifying Special Tool (24 4 260)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing, do not damage shaft seal and bearing.

If the torque converter is not correctly installed, the driver of the pump impeller may be damaged when the transmission is flanged to the engine.

Installation:

Push torque converter through shaft seal onto transmission shaft as far as it will go.

Press torque converter by hand into converter housing and turn in the process. Converter hub opening must snap into place in driver of pump impeller. Torque converter must be felt to slip inwards.

Determine distance between contact surface and surface (1) of tapped hole in torque converter with special tool 00 2 550.

NOTE: Measured value must be greater than A.

Mini Cooper S A= 17.5 mm

R56 A = 12.5 mm

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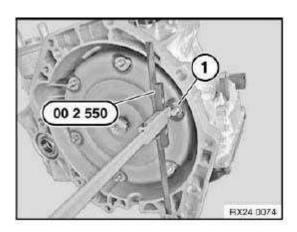


Fig. 72: Identifying Special Tool (00 2 550)
Courtesy of BMW OF NORTH AMERICA, INC.

61 ELECTRONIC CONTROL UNIT

24 61 500 REMOVING AND INSTALLING OR REPLACING EGS CONTROL UNIT

Disconnect battery.

Release bolt (1).

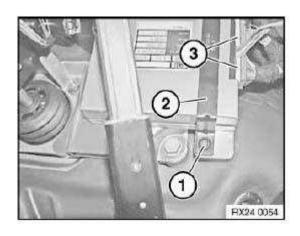
Detach retaining bar (2) from control unit.

Tightening torque. Refer to <u>AUTOMATIC TRANSMISSION - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Disconnect plug (3) and remove control unit from mounting.

IMPORTANT: The adaptation values must be reset after the control unit has been replaced.

NOTE: Illustration similar.



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Fig. 73: Identifying Retaining Bar, Plug And Bolt Courtesy of BMW OF NORTH AMERICA, INC.

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2006-07 GENINFO

Automatic Transmission - Overview - MINI

MINI GA6F21WA

GA6F21WA 6-SPEED AUTOMATIC GEARBOX

From January 2005, a 6-speed automatic transmission (manufacturer: AISIN AW CO. LTD, Japan) will be used for the first time in the MINI COOPER S and the MINI COOPER S Convertible.

The MINI COOPER will continue to be equipped with the ECVT (electronically controlled continuously variable automatic transmission).

The 6-speed automatic transmission is characterized by its short gearshift times (1/4 second) in conjunction with Agitronic.

Agitronic enables individual gear selection in drive position D by means of shift paddles on the steering wheel. The driver can shift manually in drive position D without having to use the selector lever to switch to Steptronic mode beforehand. There are four innovative shift modes associated with the Agitronic:

DRIVE POSITION SPECIFICATION

Drive Position "D"	Normai	Automatic gear shifting. Perfect combination of comfort, sportiness and fuel consumption.		
	Agitronic	Individual gear selection by means of shift paddles on the steering wheel. If there is no acceleration or manual gearshift, the automatic transmission shifts back to the normal drive position D after a short time.		
Drive Position "S"		Automatically provides extremely sporty configuration for maximum agility and ultra-quick response by the car.		
	Steptronic	Manual gear shifting by means of shift paddles on the steering wheel or the selector lever without exiting from automatic.		

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Fig. 1: ECVT (Electronically Controlled Continuously Variable Automatic Transmission) Courtesy of BMW OF NORTH AMERICA, INC.

Changes to the Engine and the Vehicle

Extensive changes have been made to the engine and the vehicle for automatic transmission operation:

- Absence of an engine oil cooler. The engine oil cooler can be omitted due to the reduced rpm range of the engine in conjunction with the automatic transmission.
- Adaptation of the coolant lines with a connection for the transmission oil cooler.
- Adaptation of the crankshaft flange to the new flywheel.
- Modification of the engine mounting location. The engine has been moved 7 mm upwards and 10 mm to the right on account of the size of the transmission.
- Transmission mounting with hydro-mounts.
- Use of a suction jet pump. The vacuum pressure for operation of the brake booster may be insufficient in certain operating states. The suction jet pump uses its Venturi effect to boost the vacuum pressure at the brake servo.
- Air intake duct with a connection for the suction jet pump.
- Adaptation of the exhaust manifold due to the new engine position.
- Extended body wiring harness for transmission control.
- A/C refrigerant lines have been redesigned due to engine mounting change.
- Output shafts adapted to the automatic transmission.
- Modification of the underbody paneling of the engine compartment. The underbody paneling has an air duct for cooling the power steering.

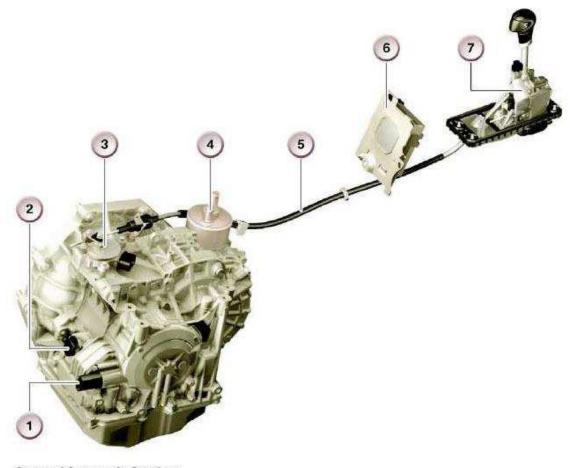
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Technical Data

TECHNICAL DATA

Gearbox	6-speed planetary gearbox (6-speed automatic transmission) with hydrodynamic torque converter for front-wheel drive		
Transmission Output	max. torque 220 Nm		
Transmission Ratios	1st gear: 4.040 4th gear: 1.160 2nd gear: 2.370 5th gear: 0.850 3rd gear: 1.550 6th gear: 0.670 Reverse gear: 3.193		
Lever Position	P-R-N-D-M/S and Steptronic		
Control	electrohydraulic		
Weight	with transmission oil and torque converter: 82.6 kg (63 lbs.)		
Towability	50 km at up to 50 km/h		
Maintenance	Maintenance-free with life-time oil filling		

System Components



6-speed Automatic Gearbox

Fig. 2: 6-Speed Automatic Gearbox Components Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of components:

- 1. Multiple pin connector 1 to EGS control unit
- 2. Multiple pin connector 2 to EGS-control unit
- 3. Selector lever position switch 7 Selector lever unit
- 4. Transmission oil cooler
- 5. Bowden cable
- 6. EGS control unit

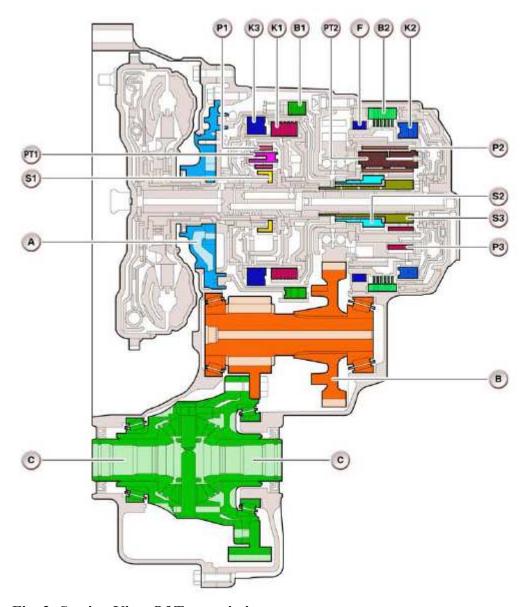


Fig. 3: Section View Of Transmission

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Courtesy of BMW OF NORTH AMERICA, INC.

Section View of Transmission

EXPLANATION CHART

Index	Explanation	Index	Explanation	
A	Oil Pump	S1	Sun Gear	
В	Intermediate Drive	K1	Multi-plate Clutch	
B1	Multi-plate Brake	S2	Sun Gear	
B2	Multi-plate Brake	K2	Multi-plate Clutch	
C	Output	Р3	Planetary Gears S3 Sun Gear	
F	Freewheel	К3	Multi-plate Clutch	
PT1	Planet Carrier	P1	Planetary Gears	
PT2	Planet Carrier	P2	Planetary Gears	

System IPO

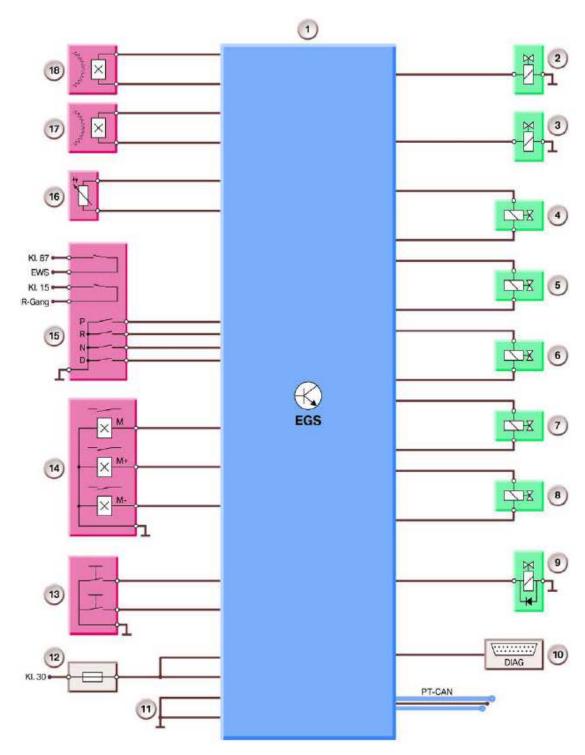


Fig. 4: System IPO Function Courtesy of BMW OF NORTH AMERICA, INC.

Legend for System IPO

EXPLANATION CHART

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Index	Explanation			
1	EGS control unit			
2-3	Solenoid valves			
4-8	Pressure control valves			
9	Electromagnet for selector lever interlock (Shiftlock			
10	On-board diagnostics socket			
11	Earth connection			
12	Fuse			
13	Gearshift paddles on steering wheel			
14	Switch for sport program and manual gear changes (on selector lever)			
	Selector lever position switch with connectors:			
15	Terminal 87Signal for electronic immobilizer (EWS)			
	o Terminal 15			
	 Reversing light control 			
16	Automatic transmission fluid temperature sensor			
17	Engine speed sensor (transmission input speed)			
18	Engine speed sensor (transmission output speed)			

DESCRIPTION OF COMPONENTS AND OPERATION

Selector Lever

The selector lever has a newly designed selector lever grip. The selector lever mechanism and the arrangement of the drive positions are identical to those of the ECVT (electronically controlled continuously variable automatic transmission).

Selector Lever Positions

The selector lever is used to select drive positions P, R, N, D and M/S.

Selector Lever Position P

The cable and the selector shaft are used to place the automatic gearbox in Park.

Selector Lever Position R

Reverse gear

Selector Lever Position D

Gears 1 to 6 are selected automatically accordance with the shift characteristics in selector lever position D.

Selector Lever Position D (Agitronic)

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Gears can also be selected manually with the selector lever in position D: The system switches automatically to manual if the paddles on the steering wheel are operated.

The gears are selected by pushing or pulling on the paddles. The gear selected is engaged as soon as the appropriate rpm and speed are reached.

The gear selected is shown on the instrument cluster display (M1 to M6).

During overtaking or if the car is driven hard, the gear can be changed quickly without first moving the selector lever to the M/S (Steptronic) position. Pulling away is only possible in 1st or 2nd gear.

If the gears are not shifted for more than 6 seconds and the vehicle is not deliberately accelerated, the gears will be shifted automatically again.

Selector Lever Position M/S

Moving the selector lever sideways to the M/S position engages the Sport program. Upshifts are made later in the Sport program, making more sporty driving possible.

To quit M/S mode, you move the selector lever forward (-) or backward (+) or use the paddles on the steering wheel to switch to manual mode (Steptronic). You move the selector lever again or use the paddles on the steering wheel, to select gears manually. The gearbox remains in manual mode until the selector lever is returned to the D position.

Changing gears using the paddles on the steering wheel puts greater pressure on the linkages than does changing gear with the selector lever. Gear changes using the pad-

Selector Lever Position Switch

The selector lever position switch is located on the selector shaft on the transmission housing. It is connected to the selector lever via a cable. The selector lever position switch sends the signals for selector lever positions P, R, N, and D to control the transmission control and the selector lever interlock (Shiftlock) on the EGS control unit.

The selector lever position is displayed on the instrument cluster. The display is controlled by the EGS control unit via the Power Train-CAN.

The reversing lights are supplied with 12 V vehicle voltage directly by the selector lever position switch.

The P/N signal for the starter lock comes from the selector lever position switch via a line to the immobilizer control unit.

The selector lever position switch must be readjusted after replacement and installation of the automatic gearbox. Observe the Repair Instructions.

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Selector Lever Position Switch

- 1. Selector lever position switch
- 2. Cable to selector lever

Fig. 5: Selector Lever Position Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Selector Lever Interlock (Shiftlock)

The shiftlock prevents the driver pulling away inadvertently by shifting the selector lever by mistake with the engine running. The selector lever is blocked by an electromagnet in positions P and N. Power to the electromagnet is supplied by the EGS from terminal 15 ON.

When the brake pedal is depressed, the power supply is interrupted and the selector lever released. At terminal 15 OFF, the lever can still be shifted to position P and is then locked.

Safety Catch (Interlock)

The ignition key can only be removed with the selector lever in position P. The ignition lock housing has a bowden cable coming from the selector lever.

Starter Lock

The engine can only be started with the selector lever in positions P or N. This information is sent along a separate lead from the selector lever position switch to the electronic vehicle immobilizer (EWS) control module.

Converter Lockup Clutch

Torque from the engine is transferred to the gearbox by a torque converter fitted with a gradual lockup clutch. The lockup clutch ensures a positive lock between the engine and automatic gearbox, thus reducing consumption.

The converter lockup clutch is closed in gears 2 to 6 as a function of the following factors:

- Accelerator pedal position
- Transmission output speed (locked above 1800 rpm)
- Drive program

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- Transmission fluid temperature (always unlocked below 20°C so the that the transmission oil heats up faster).
- Selected gear

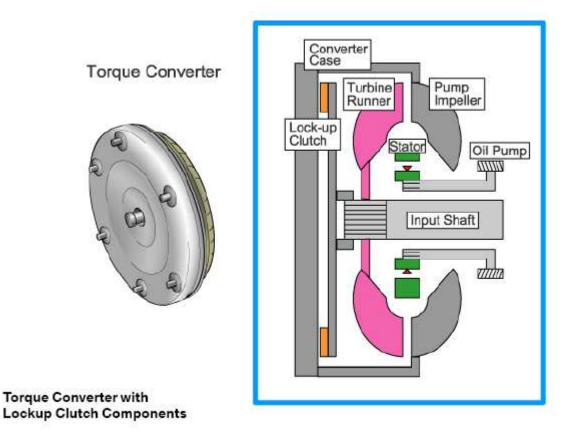


Fig. 6: Converter Lockup Clutch Courtesy of BMW OF NORTH AMERICA, INC.

Planetary Gear Set

A Lepelletier design planetary gear set is used in the automatic gearbox. This makes for smooth gear changing with only five shift elements and a freewheel.

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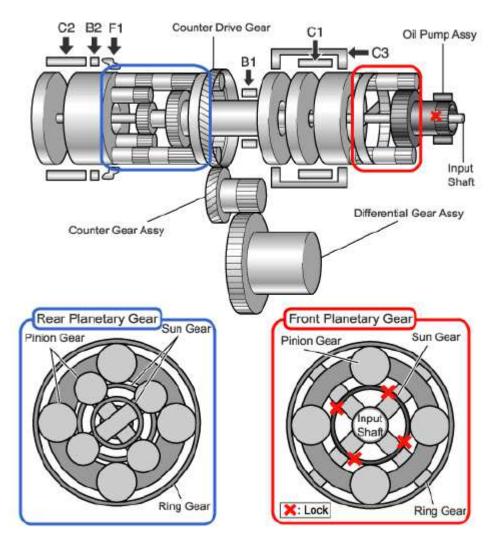


Fig. 7: Planetary Gear Set Courtesy of BMW OF NORTH AMERICA, INC.

Oil Pump

The automatic gearbox is fitted with an oil pump to supply the necessary hydraulic pressure. The oil pump is driven by the input shaft.

Transmission Oil Cooler

The transmission oil cooler is bolted to the gearbox housing. It connects to the engine coolant circuit via two lines. The transmission oil cooler speeds up transmission oil heating while the engine is warming up. When the engine reaches operating temperature, the coolant reduces the temperature of the transmission oil.

ELECTRONIC GEARBOX CONTROL (EGS)

EGS Control Unit

The EGS control unit in located in the vehicle interior underneath the steering column. Data is exchanged with

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the following controllers on the Power Train-CAN:

- DME
- DSC (including. ABS / ASC)
- Instrument cluster.

NOTE: The adaptive values must be reset using the BMW diagnosis system after the EGS control unit has been replaced.

Throttle-valve Signal

The throttle-valve signal is the load requirement signal and is needed by the electronics when selecting gears.

Injection Signal

The injection signal is the engine load status signal. It, plus the throttle-valve signal and the pulling-away signal are needed when changing gears.

Engine Intervention

During gear changing, the transmission electronics complement the engine electronics by retarding ignition timing for about 200 ms. This reduces the engine torque momentarily, improves shift quality, the load on the transmission is reduced, and the shift time is reduced.

Kickdown

If the driver presses the accelerator pedal to the floor (kickdown), the full load voltage value of the accelerator pedal module is exceeded.

Once a voltage value set in the engine control unit is reached (4300 mV), this is interpreted by the DME as kickdown, and this information sent from the DME via the PTCAN to the EGS control unit.

Transmission Input Speed

There is a speed sensor for the transmission input speed on the gearbox input shaft. The speed sensor operates on the Hall principle. The electronic gearbox controller needs to know the exact transmission input speed for the following functions:

- Control, adaptation and monitoring of gear changes
- Control and monitoring of the converter lockup clutch
- Diagnosis of shift elements and plausibility checking of engine and gearbox output speeds.

Gearbox Output Speed

There is a speed sensor for the gearbox output speed on the parking interlock gear. The speed sensor operates on the Hall principle. The electronic gearbox controller needs to know the exact transmission input speed for the following functions:

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- Selection of gear change point
- Diagnosis of shift elements and plausibility checking of engine and turbo unit output speeds.

DSC

The selected gear is limited to 4500 rpm during DSC intervention. Changing gear would have a negative effect on driving stability. The transmission changes up automatically above 4500 rpm to reduce the torque to the wheels. No special winter program is needed in the electronic transmission controller, thanks to DSC control and front-wheel drive.

Transmission Fluid Temperature

The transmission fluid temperature sensor is located in the gearbox oil in the electrohydraulic control gear. Transmission fluid temperature information is needed for the following functions:

- To match the shift pressure (system pressure) and pressure increase and decrease during gear changes
- To activate and deactivate temperature dependent function such as engaging the converter lockup clutch.

Brake Light Switch

The brake-light-switch signal comes from the PT-CAN. It is needed for the operation of the selector lever interlock (shift-lock) and for transmission control (e.g. gradient detection function).

Engine Speed

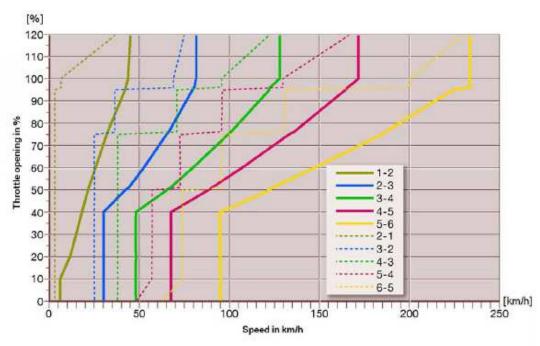
Engine speed data is needed in the EGS control unit for safety functions, e.g. to prevent downshifting if it could over-rev the engine.

Shift Characteristics

The EGS control unit determines the change-up and change-down points as a function of:

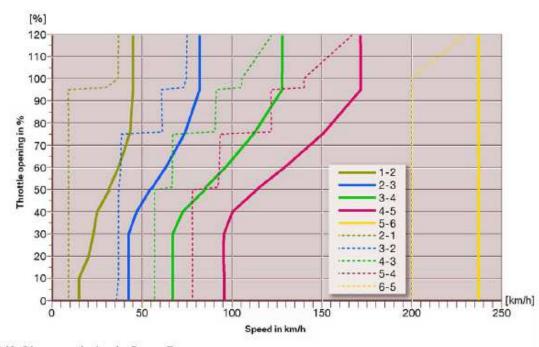
- Driver's desired load (accelerator pedal and throttle-valve position)
- Transmission output speed
- Selector-lever setting
- Kickdown signal

The shift points vary, depending on temperature (temperature sensor in electrohydraulic control gear).



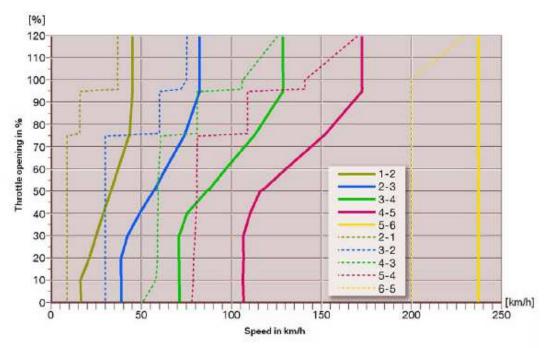
Shift Characteristics in Drive Position

Fig. 8: Shift Characteristics In Drive Position Graph Courtesy of BMW OF NORTH AMERICA, INC.



Shift Characteristics in Sport Program

<u>Fig. 9: Shift Characteristics In Sport Program Graph</u> Courtesy of BMW OF NORTH AMERICA, INC.



Shift Characteristics During Gradient Detection

<u>Fig. 10: Shift Characteristics During Gradient Detection Graph</u> Courtesy of BMW OF NORTH AMERICA, INC.

Gradient Detection

The transmission control is fitted with a gradient detection function in shift lever positions D and SD. It detects whether the vehicle is travelling uphill or downhill by comparing the engine torque and the selected gear on the one hand, and wheel speed on the other.

When travelling uphill, the controller selects the gear which best provides the vehicle with sufficient reserves of traction.

When travelling downhill, the gear is held after use of the brake or a manual downshift. The transmission changes down when brake use is detected.

Fast-off Detection

To decelerate, the driver takes his foot off the accelerator pedal and uses the brakes is necessary. Closure of the throttle caused by the change in shift characteristics, tends to make the transmission upshift.

This gear change is not desirable because it hinders the braking effect of the engine. In addition, in many cases, using the brake pedal again shortly after shifting up or down considerably increases shift frequency.

The objective of this function is, therefore, to block upshifting in the circumstances described. The driver's desire to decelerate is detected by very fast return of the pedal into the zero position (Fast-Off). If this action is detected, upshifting is suppressed while the accelerator is in the zero position and the vehicle is moving.

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Cornering Detection

Shifting up in corners is prevented above a defined lateral acceleration. The radius of the bend is detected from the differences in speed of the inside and outside wheels. An accurate enough calculation of the lateral acceleration is made by taking the travelling speed into consideration. Identical front wheel tire circumferences are a prerequisite for this calculation.

VALVE BODY

The valve body (electrohydraulic selector unit) is located in the automatic gearbox. It is covered by the transmission oil sump. The valve body sets the drive and brake clutches to the correct hydraulic pressure.

A selector switch is triggered in the valve body by the cable on the selector lever. The gear selector valve regulates the transmission oil (main pressure) as a function of the selector lever position in relation to the corresponding solenoid valves in the transmission.

The following components for transmission control are also located in the valve body:

- Oil temperature sensor
- Solenoid valves (2x)
- Pressure control valves (6x).

The valve body is connected to the EGS control unit by two multiple pin connectors (on the gearbox housing).

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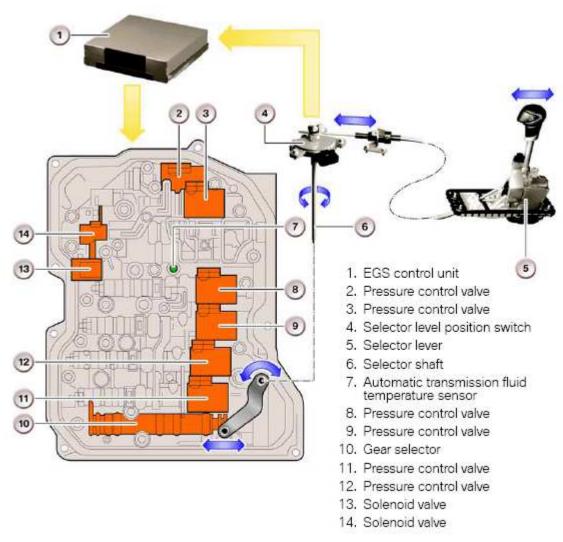


Fig. 11: Valve Body Function Courtesy of BMW OF NORTH AMERICA, INC.

Automatic Transmission Fluid Temperature Sensor

The automatic transmission fluid temperature sensor is located in the transmission oil in the electrohydraulic selector unit. It is soldered into the transmission wiring harness.

TRANSMISSION OIL TEMPERATURE CHART

THE CONTROL OF THE CHART OF THE CHART					
Transmission Oil Temperature	10°C	25°C	110°C		
Resistance Value	5.62-7.31 (kohms)	3.5 (kohms)	0.22-0.27 (kohms)		

Solenoid Valves

There are two solenoid valves (3/2-way valves) in the valve body for sending switching signals such as "Fill clutch" or "Bleed" to the hydraulic controller.

Both solenoid valves are controlled by the EGS controller. They switch either open or closed. First gear or

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reverse are selected when the valves are activated.

Delivery pressure is blocked in the de-energized state and the working volume connected to zero drain. When current is applied, the delivery pressure is the same as the working pressure and zero drain is blocked.

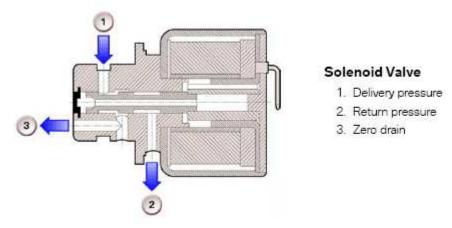


Fig. 12: Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Pressure Control Valves

The pressure control valves translate an electrical current into a proportional hydraulic pressure. They are controlled by the EGS control unit and operate the valves associated with the shift elements. They are controlled by a PWM signal (300Hz at 0.1A to 1A).

There are six pressure control valves in the electrohydraulic selector unit. Valves (8, 9, 11, 12) use fluid pressure to control the 3 drive clutches and both brake clutches.

Valve (2) switches the converter lockup clutch.

Valve (3) regulates the oil pressure in the transmission as a function of the throttle-valve-position and engine torque.

The pressure control valves are used to make gear overlap and adaptive pressure control of each clutch possible.

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Valve Body

- 2. Pressure control valve
- Pressure control valve
- Automatic transmission fluid temperature sensor
- 8. Pressure control valve
- Pressure control valve
- 10. Gear selector
- 11. Pressure control valve
- 12. Pressure control valve
- 13. Solenoid valve
- 14. Solenoid valve

Fig. 13: Pressure Control Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Overlap Control

Automatic gearboxes differentiate between overlap control and freewheel control. In the case of overlap control, one clutch is partially filled while another is drained. Partial filling is maintained (pressure approximately 1 bar) until a synchronous speed is achieved. After that, the pressure for the clutch being filled can be increased to full.

Freewheel control is only used when changing from first to second gear.

Adaptive Pressure Control

Adaptive pressure control improves shift quality during the life of the vehicle. Slip times are measured during upshifting and compared with a specified value. As soon as a programmed limit value is exceeded, the pressure is first increased, then reduced to the correct value using an approximation technique. This compensates for differences in the friction pad and brings about height matching.

Diagnostics

Faults in the sensors, actuators and the EGS controller are stored in the fault code memory, and can be read using the BMW diagnostic system.

Emergency Operation Program

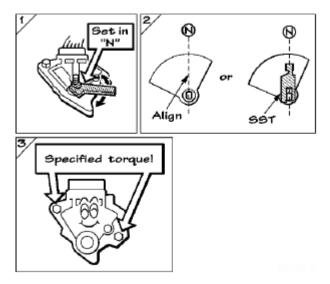
The solenoid and pressure control valves are no longer controlled by the EGS control unit if a fault occurs. In this case, an emergency operation program is activated and 3rd gear selected to make it possible to continue driving slowly. The display on the instrument cluster shows the letters EP (Emergency Program).

SERVICE INFORMATION

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Selector Lever Position Switch

The selector lever position switch must be readjusted after replacement and refitting of the automatic gearbox.



<u>Fig. 14: Selector Lever Position Switch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Adjustment

- 1. Place selector lever in vehicle to Neutral.
- 2. Align the selector switch on the transmission to Neutral.
- 3. Tighten switch assembly as per tightening torque.

EGS Control Unit

The information on of the transmission control unit can be read as follows:

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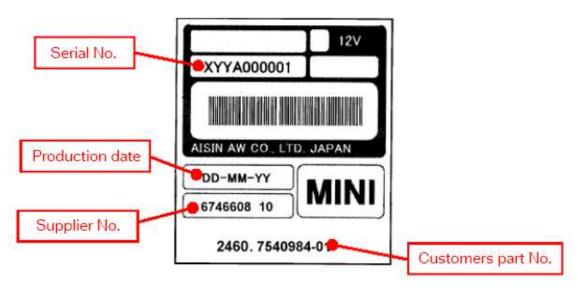


Fig. 15: EGS Control Unit Label Courtesy of BMW OF NORTH AMERICA, INC.

The adaptive values must be reset using the BMW diagnostic system after the EGS control unit has been replaced.

Transmission

The Aisin transmission has two label on the side. One label is the factory label from AISIN and the other is the BMW Group label.

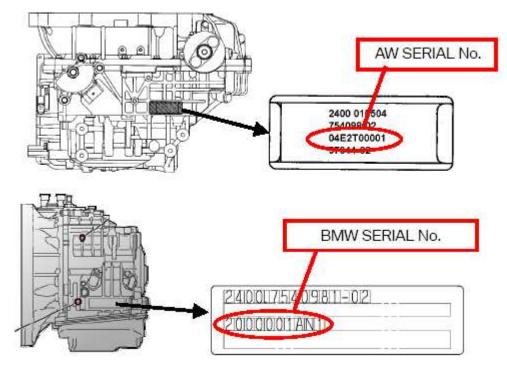


Fig. 16: Transmission Label Location

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Courtesy of BMW OF NORTH AMERICA, INC.

The label on the transmission can be interpreted as follows:

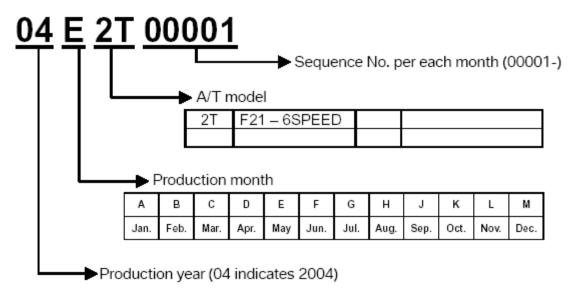


Fig. 17: Transmission VIN Number Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Fluid

The GA6F21WA transmission is filled with lifetime fluid from the factory. Transmission oil change should only be performed upon technical hotline request. When replacing parts on this transmissions, drain fluid into a clean container and reuse.

The oil used is supplied by ESSO (Exxon) and is labeled JAPAN ESSO JWS-3309 (part number 83 22 7 542 990).

The automatic transmission provides filtered, pressure regulated hydraulic fluid for all of the transmissions functional requirements. All BMW automatic transmissions are designed to operate with specific fluids. Use of non-approved oil will cause malfunctions and irreparable transmission damage which is not covered by BMW warranty.

The transmission fluid provides the following functions:

- Lubricates mechanical components (planetary gears, bearings etc.).
- Removes heat and transfers heat to transmission cooling system. (Heat Exchanger).
- Removes debris and contaminants to sump and filter when circulated.
- Provides a transfer of kinetic energy in the torque converter.
- Allows hydraulic operation of mechanical components (clutches, brakes) via control of the valve body.

Also, transmission fluid has various properties to prevent oxidation and breakdown from heat and friction. Each type of transmission fluid has properties specific for each transmission application.

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Fluid level is crucial in the proper operation of an automatic transmission. Improper fluid levels will cause improper operation and eventually irreparable transmission damage.

Improper fluid level can cause:

- A low fluid level can cause an interruption in oil flow during fast acceleration or hard braking which can cause gear shift malfunctions and noises.
- An excessively high fluid level can cause the rotating mechanical components to paddle in the oil. This produces foam which introduces air into the hydraulic system.
- A low fluid level can also cause transmission overheating causing premature transmission failure.

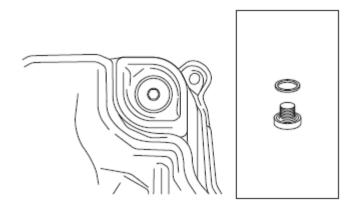
Transmission Fluid Checking Procedures

Transmission fluid checking is accomplished using the DISplus or GT1. The DISplus or GT1 is used to monitor transmission fluid temperature to insure the transmission is not over or under-filled. There is no dipstick, the fluid level is checked by monitoring the overflow coming from the overflow hole while filling via the fill plug.

Transmission fluid should be checked between 35 and 45°C. Use the DISplus and/or GT1 to determine transmission temperature. The transmission temperature information can be found in the diagnosis section under Service Functions

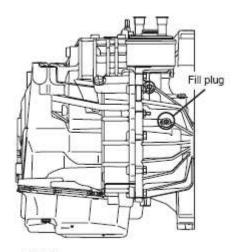
When checking transmission fluid, observe the following items:

- Transmission in Park
- Parking brake applied
- Vehicle level
- No engine load
- Trans Temp 35-45°C
- Observe correct drain plug torque
- Use correct fluid



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Fig. 18: Overflow Plug (Oil Pan) Courtesy of BMW OF NORTH AMERICA, INC.



Fill Plug

Fig. 19: Fill Plug Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Fluid Checking Procedures (cont.)

- 1. Park the vehicle on a flat load and lock the tires.
- 2. Shift the shift lever to "P" range. Do not start engine.
- 3. Remove the overflow plug and filling plug.
- 4. Check if automatic transmission fluid drops from the overflow hole.

If Automatic transmission fluid does not drop, additional automatic transmission fluid to be filled until automatic transmission fluid drops.

- 5. Start the engine.
- 6. Check if automatic transmission fluid drops again from the overflow hole.

If Automatic transmission fluid does not drop, additional automatic transmission fluid to be filled until automatic transmission fluid drops.

- 7. At this point try to maintain automatic transmission fluid in less than 35°C.
- 8. Shift all range from "P" to "D" with the expenditure of more than 2 seconds per each range and return to "P" after performing the 2 times shifting with foot braking.
- 9. Check automatic transmission fluid drops from the overflow hole.

If automatic transmission fluid drops: Confirm the automatic transmission fluid at temperature between 35-45°C with oil temperature sensor and wait until automatic transmission fluid does dribble out from overflow plug.

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- 10. Coat a new "O" ring with automatic transmission fluid, and install it to the fill plug.
- 11. Using a hexagon wrench, install the overflow plug.

NOTE: Be sure to wipe off spilled automatic transmission fluid completely after tighten fill plug.

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GENERAL INFORMATION

Trouble Shooting - Basic Procedures

* PLEASE READ THIS FIRST *

NOTE:

This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem

symptoms. For model-specific Trouble Shooting, refer to SUBJECT,

DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

ACCESSORIES & ELECTRICAL

CHARGING SYSTEM TROUBLE SHOOTING

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BASIC CHARGING SYSTEM TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Vehicle Will Not Start	
Dead battery	Check battery cells, alternator belt tension and alternator output
Loose or corroded battery connections	Check all charging system connections
Ignition circuit or switch malfunction	Check and replace as necessary
Alternator Light Stays On With Engine Running	
Loose or worn alternator drive belt	Check alternator drive tension and condition, See Belt Adjustment in TUNE-UP article in the TUNE-UP section
Loose alternator wiring connections	Check all charging system connections

Short in alternator light wiring	See Indicator Warning Lights in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section
Defective alternator stator or diodes	See Bench Tests in ALTERNATOR article
Defective regulator	See Regulator Check in ALTERNATOR article
Alternator Light Stays Off With Ignition Switch ON	
Blown fuse	See WIRING DIAGRAMS
Defective alternator	See Testing in ALTERNATOR article
Defective indicator light bulb or socket	See Indicator Warning Lights in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section
Alternator Light Stays OFF With Ignition Switch ON	
Short in alternator wiring	See On-Vehicle Tests in ALTERNATOR article
Defective rectifier bridge	See Bench Tests in ALTERNATOR article
Lights or Fuses Burn Out Frequently	
Defective alternator wiring	See On-Vehicle Tests in ALTERNATOR article
Defective regulator	See Regulator Check in ALTERNATOR article
Defective battery	Check and replace as necessary
Ammeter Gauge Shows Discharge	
Loose or worn drive belt	Check alternator drive belt tension and condition. See Belt Adjustment in TUNE-UP article in the TUNE-UP section
Defective wiring	Check all wires and wire connections
Defective alternator or regulator	See Bench Tests and On- Vehicle Tests in ALTERNATOR article
Defective ammeter, or improper ammeter wiring connection	See Testing in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section
Noisy Alternator	
Loose drive pulley	Tighten drive pulley attaching nut

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Loose mounting bolts	Tighten all alternator mounting bolts
Worn or dirty bearings	See Bearing Replacement ALTERNATOR article
Defective diodes or stator	See Bench Test in ALTERNATOR article
Battery Does Stay Charged	
Loose or worn drive belt	Check alternator drive belt tension and condition. See Belt Adjustment in appropriate TUNE-UP article in the TUNE- UP section
Loose or corroded battery connections	Check all charging system connections
Loose alternator connections	Check all charging system connections
Defective alternator or battery	See On-Vehicle Tests and Bench Tests in ALTERNATOR article
Add-on electrical accessories exceeding alternator capacity	Install larger alternator
Battery Overcharged-Uses Too Much Water	
Defective battery	Check alternator output and repair as necessary
Defective alternator	See On-Vehicle Test and Bench Tests in ALTERNATOR article
Excessive alternator voltage	Check alternator output and repair as necessary

IGNITION SYSTEM TROUBLE SHOOTING

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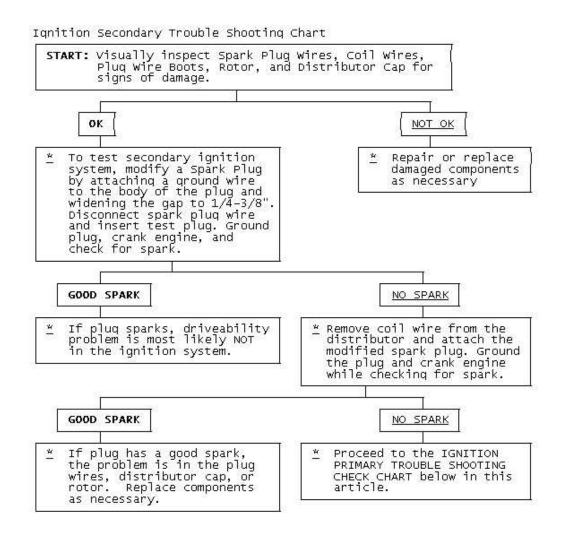
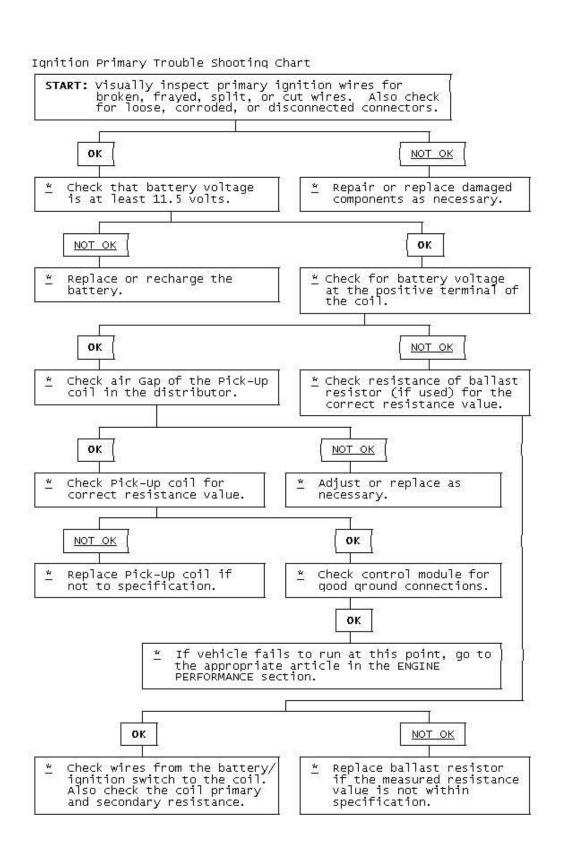


Fig. 1: Ignition Secondary Trouble Shooting Chart



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Fig. 2: Ignition Primary Trouble Shooting Chart

STARTER TROUBLE SHOOTING

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BASIC STARTER TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Starter Fails to Operate	
Dead battery or bad connections between starter and battery	Check battery charge and all wires and connections to starter
Ignition switch faulty or misadjusted	Adjust or replace ignition switch
Open circuit between starter switch ignition terminal on starter relay	Check and repair wires and connections as necessary
Starter relay or starter defective	See Testing in STARTER article
Open solenoid pull-in wire	Testing in STARTER article
Starter Does Not Operate and Headlights Dim	
Weak battery or dead cell	Charge or replace battery as necessary
Loose or corroded battery connections	Check that battery connections are clean and tight
Internal ground in starter windings	See Testing in STARTER article
Grounded starter fields	See Testing in STARTERS
Armature rubbing on pole	See STARTER article shoes
Starter Turns but Engine Does Not Rotate	
Starter clutch slipping	See STARTER article
Broken clutch housing	See STARTER article
Pinion shaft rusted or dry	See STARTER article
Engine basic timing incorrect	See Ignition Timing in TUNE- UP article
Broken teeth on engine flywheel	Replace flywheel and check for starter pinion gear damage
Starter Will Not Crank Engine	
Faulty overrunning clutch	See STARTER article
Broken clutch housing	See STARTER article
Broken flywheel teeth	Replace flywheel and check

	for starter pinion gear damage
Armature shaft sheared or reduction gear teeth stripped	See STARTER article
Weak battery	Charge or replace battery as
	necessary
Faulty solenoid	See On-Vehicle Tests in
	STARTER article
Poor grounds	Check all ground connections
	for tight and clean connections
Ignition switch faulty or misadjusted	Adjust or replace ignition
	switch as necessary
Starter Cranks Engine Slowly	
Battery weak or defective	Charge or replace battery as
	necessary
Engine overheated	See ENGINE COOLING
	SYSTEM article
Engine oil too heavy	Check that proper viscosity oil
D 1 (1)	is used
Poor battery-to-starter connections	Check that all between battery
C	and starter are clean and tight
Current draw too low or too high	See Bench Tests in STARTER article
Dant armeture looge note shoos service or warm bearing	See STARTER article
Bent armature, loose pole shoes screws or worn bearing	
Burned solenoid contacts	Replace solenoid
Faulty starter	Replace starter
Starter Engages Engine Only Momentarily	
Engine timing too far advanced	See Ignition Timing in TUNE-
	UP article
Overrunning clutch not engaging properly	Replace overrunning clutch.
	See STARTER article
Broken starter clutch	See STARTER article
Broken teeth on engine flywheel	Replace flywheel and check
WY 1 1:	starter pinion gear for damage
Weak drive assembly thrust spring	See STARTER article
Weak hold-in coil	See Bench Tests in STARTER
	article
Starter Drive Will Not Engage	
Defective point assembly	See Testing in STARTER
	article
Poor point assembly ground	See Testing in STARTER
	article
Defective pull-in coil	Replace starter solenoid
Starter Relay Does Not Close	
Dead battery	Charge or replace battery as

	necessary
Faulty wiring	Check all wiring and
	connections leading to relay
Neutral safety switch faulty	Replace neutral safety switch
Starter relay faulty	Replace starter relay
Starter Drive Will Not Disengage	
Starter motor loose on mountings	Tighten starter attach bolts
Worn drive end bushing	See STARTER article
Damaged engine flywheel teeth	Replace flywheel and starter
	pinion gear for damage
Drive yolk return spring broken or missing	Replace return spring
Faulty ignition switch	Replace ignition switch
Insufficient clearance between winding leads to solenoid terminal and main contact in solenoid	Replace starter solenoid
Starter clutch not disengaging	Replace starter clutch
Ignition starter switch	Replace ignition switch
	contacts sticking
Starter Relay Operates but Solenoid Does Not	
Faulty solenoid switch, switch connections or relay	Check all wiring between relay
	and solenoid or replace relay
	or solenoid as necessary
Broken lead or loose soldered connections	Repair wire or wire
	connections as necessary
Solenoid Plunger Vibrates When Switch is Engaged	
Weak battery	Charge or replace battery as
	necessary
Solenoid contacts corroded	Clean contacts or replace solenoid
Faulty wiring	Check all wiring leading to
radity withing	solenoid
Broken connections inside switch cover	Repair connections or replace
Broken connections inside switch cover	solenoid
Open hold-in wire	solenoid
Low Current Draw	
Worn brushes or weak brush springs	Replace brushes or brush
	springs as necessary
High Pitched Whine During Cranking Before Engine Fires but Engine	•
Distance too great between starter pinion and flywheel	Align starter or check that
, ,	correct starter and flywheel are
	being used
High Pitched Whine After Engine Fires With Key released. Engine Fires	res and Cranks Normally
Distance too small between starter pinion and flywheel	Flywheel runout contributes to
	the intermittent nature

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AIR CONDITIONING & HEAT

AIR CONDITIONING TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC AIR CONDITIONING TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE
Compressor Not Working	Compressor clutch circuit open.
	Compressor clutch coil inoperative.
	Poor clutch ground connection.
	Fan belts loose.
	Thermostatic switch inoperative.
	Thermostatic switch not adjusted.
	Ambient temperature switch open.
	Superheat fuse blown.
Excessive Noise or Vibration	Missing or loose mounting bolts.
	Bad idler pulley bearings.
	Fan belts not tightened correctly.
	Compressor clutch contacting body.
	Excessive system pressure.
	Compressor oil level low.
	Damaged clutch bearings.
	Damaged reed valves.
	Damaged compressor.
Insufficient or No Cooling; Compressor Working	Expansion valve inoperative.
	Heater control valve stuck open.
	Low system pressure.
	Blocked condenser fins.
	Blocked evaporator fins.
	Vacuum system leak.
	Vacuum motors inoperative.
	Control cables improperly adjusted.
	Restricted air inlet.
	Mode doors binding.
	Blower motor inoperative.
	•

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	Temperature above system capacity.
••••	Temperature as the system expansity.

HEATER SYSTEM TROUBLE SHOOTING

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BASIC HEATER SYSTEM TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE
Insufficient, Erratic, or No Heat	Low Coolant Level
	Incorrect thermostat.
	Restricted coolant flow through core.
	Heater hoses plugged.
	Misadjusted control cable.
	Sticking heater control valve.
	Vacuum hose leaking.
	Vacuum hose blocked.
	Vacuum motors inoperative.
	Blocked air inlet.
	Inoperative heater blower motor.
	Oil residue on heater core fins.
	Dirt on heater core fins.
Too Much Heat	Improperly adjusted cables.
	Sticking heater control valve.
	No vacuum to heater control valve.
	Temperature door stuck open.
Air Flow Changes During	Vacuum system leak.
Acceleration	
	Bad check valve or reservoir.
Air From Defroster At All Times	Vacuum system leak.
	Improperly adjusted control cables.
	Inoperative vacuum motor.
Blower Does Not Operate Correctly	Blown fuse.
	Blower motor windings open.
	Resistors burned out.
	Motor ground connection loose.
	Wiring harness connections loose.
	Blower motor switch inoperative.
	Blower relay inoperative.

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 Fan binding or foreign object in housing.
 Fan blades broken or bent.

BRAKES

BRAKE SYSTEM TROUBLE SHOOTING

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BRAKE SYSTEM TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Brakes Pull Left or Right	
Incorrect tire pressure	Inflate tires to proper pressure
Front end out of alignment	See WHEEL ALIGNMENT
Mismatched tires	Check tires sizes
Restricted brake lines or hoses	Check hose routing
Loose or malfunctioning caliper	See DISC BRAKES or BRAKE SYSTEM
Bent shoe or oily linings	See DRUM BRAKES or BRAKE SYSTEM
Malfunctioning rear brakes	See DRUM, DISC BRAKES or BRAKE SYSTEM
Loose suspension parts	See SUSPENSION
Noises Without Brakes Applied	
Front linings worn out	Replace linings
Dust or oil on drums or rotors	See DRUM, DISC BRAKES or BRAKE SYSTEM
Noises With Brakes Applied	,
Insulator on outboard shoe damaged	See DISC BRAKES or BRAKE SYSTEM
Incorrect pads or linings	Replace pads or linings
Brake Rough, Chatters or Pulsates	
Excessive lateral runout	Check rotor runout
Parallelism not to specifications	Reface or replace rotor
Wheel bearings not adjusted	See SUSPENSION
Rear drums out-of-round	Reface or replace drums
Disc pad reversed, steel against rotor	Remove and reinstall pad
Excessive Pedal Effort	
Malfunctioning power unit	See POWER BRAKES or

	BRAKE SYSTEM
Partial system failure	Check fluid and pipes
Worn disc pad or lining	Replace pad or lining
Caliper piston stuck or sluggish	See DISC BRAKES or
r r r	BRAKE SYSTEM
Master cylinder piston stuck	See MASTER CYLINDERS
y 1	or BRAKE SYSTEM
Brake fade due to incorrect pads for linings	Replace pads or linings
Linings or pads glazed	Replace pads or linings
Worn drums	Reface or replace drums
Excessive Pedal Travel	1
Partial brake system failure	Check fluid and pipes
Insufficient fluid in master cylinder	See MASTER CYLINDERS
insufficient field in muster cylinder	or BRAKE SYSTEM
Air trapped in system	See BRAKE BLEEDING or
T. T	BRAKE SYSTEM
Rear brakes not adjusted	See Adjustments in DRUM
3	BRAKES or BRAKE
	SYSTEM
Bent shoe or lining	See DRUM BRAKES or
	BRAKE SYSTEM
Plugged master cylinder cap	See MASTER CYLINDERS
	or BRAKE SYSTEM
Improper brake fluid	Replace brake fluid
Pedal Travel Decreasing	
Compensating port plugged	See MASTER CYLINDERS
	or BRAKE SYSTEM
Swollen cup in master cylinder	See MASTER CYLINDERS
	or BRAKE SYSTEM
Master cylinder piston not returning	See MASTER CYLINDERS
	or BRAKE SYSTEM
Weak shoe retracting springs	See DRUM BRAKES
	BRAKE SYSTEM
Wheel cylinder piston sticking	See DRUM BRAKES or
	BRAKE SYSTEM
Dragging Brakes	
Master cylinder pistons not returning	See MASTER CYLINDERS
	BRAKE SYSTEM
Restricted brake lines or hoses	Check line routing
Incorrect parking brake adjustment	See DRUM BRAKES
	BRAKE SYSTEM
Parking Brake cables frozen	See DRUM BRAKES
	BRAKE SYSTEM
Swollen cup in master cylinder Master cylinder piston not returning Weak shoe retracting springs Wheel cylinder piston sticking Dragging Brakes Master cylinder pistons not returning Restricted brake lines or hoses Incorrect parking brake adjustment	See MASTER CYLING or BRAKE SYS See MASTER CYLING or BRAKE SYS See DRUM BRAKE BRAKE SYS See DRUM BRAKE BRAKE SYS See MASTER CYLING BRAKE SYS Check line ro See DRUM BRA BRAKE SYS Check SYS

GENERAL INFORMATION Trouble Shooting - Basic Procedures

Incorrect installation of inboard disc pad	Remove and replace correctly
Power booster output rod too long	See POWER BRAKE UNITS
-	BRAKE SYSTEM
Brake pedal not returning freely	See DISC, DRUM BRAKES
	BRAKE SYSTEM
Brakes Grab or Uneven Braking Action	
Malfunction of combination valve	See CONTROL VALVE or
	BRAKE SYSTEM
Malfunction of power brake unit	See POWER BRAKE UNITS
	or BRAKE SYSTEM
Binding brake pedal	See DISC, DRUM BRAKES
	or BRAKE SYSTEM
Pulsation or Roughness	
Uneven pad wear caused by caliper	See DISC BRAKES or
	BRAKE SYSTEM
Uneven rotor wear	See DISC BRAKES or
	BRAKE SYSTEM
Drums out-of-round	Reface or replace drums

ENGINE MECHANICAL

COOLING SYSTEM TROUBLE SHOOTING

NOTE:

This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

COOLING SYSTEM TROUBLE SHOOTING

CONDITION & POSSIBLE CAUSE	CORRECTION
Overheating	
Coolant Leak	Fill/Pressure Test Systen
A/C Condenser Fins Clogged	Remove/Clean Condense
Radiator Fins Clogged	Remove/Clean Radiato
Thermostat Stuck Closed	Replace Thermosta
Clogged Cooling System Passages	Clean/Flush Cooling Systen
Water Pump Malfunction	Replace Water Pump
Fan Clutch Malfunction	Replace Fan Clutch
Retarded Ignition Timing	Reset Ignition Timing
Cooling Fan Malfunction	Test Cooling Fan/Circui
Cooling Fan Motor Malfunction	Test Fan Moto
Cooling Fan Relay Malfunction	Test Fan Relay

GENERAL INFORMATION Trouble Shooting - Basic Procedures

Faulty Radiator Cap	Replace Radiator Cap
Broken/Slipping Fan Belt	Replace Fan Belt
Restricted Exhaust	Repair Exhaust System
Corrosion	
Impurities In Coolant	Clean/Flush System
Coolant Leakage	
Damaged hose	Replace Hose
Leaky Water Pump	Replace Water Pump
Damaged Radiator Seam	Replace/Repair Radiator
Leaky Thermostat Cover	Replace Thermostat Cover
Cylinder Head Problem	Check Head/Head Gasket
Leaky Freeze Plugs	Replace Freeze Plugs
Recovery System Inoperative	
Loose and/or Defective Radiator Cap	Replace Radiator Cap
Overflow Tube Clogged and/or Leaking	Repair Tube
Recovery Bottle Vent Restricted	Clean Vent
No Heater Core Flow	
Collapsed Heater Hose	Replace Heater Hose
Plugged Heater Core	Clean/Replace Heater Core
Faulty Heater Valve	Replace Heater Valve

GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING

NOTE:

This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Lopes At Idle	
Intake manifold-to-head leaks	Replace manifold gasket, See ENGINES
Blown head gasket	Replace head gasket, See ENGINES
Worn timing gears, chain or sprocket	Replace gears, chain or sprocket
Worn camshaft lobes	Replace camshaft, See ENGINES
Overheated engine	Check cooling system, See COOLING
Blocked crankcase vent valve	Remove restriction

Leaking EGR valve	Repair leak and/or replace valve
Faulty fuel pump	Replace fuel pump
Engine Has Low Power	
Leaking fuel pump	Repair leak and/or replace fuel pump
Excessive piston-to-bore clearance	Install larger pistons, See ENGINES
Sticking valves or weak valve springs	Check valve train components, See ENGINES
Incorrect valve timing	Reset valve timing, See ENGINES
Worn camshaft lobes	Replace camshaft, See ENGINES
Blown head gasket	Replace head gasket. See ENGINES.
Clutch slipping	Adjust pedal and/or replace components, See ENGINES
Engine overheating	Check cooling system, See COOLING
Auto. Trans. pressure regulator valve faulty	Replace pressure regulator valve
Auto. Trans. fluid level too low	Add fluid as necessary
Improper vacuum diverter valve operation	Replace vacuum diverter valve
Vacuum leaks	Inspect vacuum system and repair as required
Leaking piston rings	Replace piston rings, See ENGINES
Faulty High Speed Operation	
Low fuel pump volume	Replace fuel pump
Leaking valves or worn	Replace valves and/or springs, See ENGINES
Incorrect valve timing	Reset valve timing,See ENGINES
Intake manifold restricted	Remove restriction
Worn distributor shaft	Replace distributor
Faulty Acceleration	
Improper fuel pump stroke	Remove pump and reset pump stroke
Incorrect ignition timing	Reset ignition timing, See TUNE-UP
Leaking valves	Replace valves, See ENGINES

Worn fuel pump diaphragm or piston	Replace diaphragm or piston
Intake Backfire	
Improper ignition timing	Reset ignition timing, See TUNE-UP
Faulty accelerator pump discharge	Replace accelerator pump
Improper choke operation	Check choke and adjust as required
Defective EGR valve	Replace EGR valve
Fuel mixture too lean	Reset air/fuel mixture, See TUNE-UP
Choke valve initial clearance too large	Reset choke valve initial clearance
Exhaust Backfire	
Vacuum leak	Inspect and repair vacuum system
Faulty vacuum diverter valve	Replace vacuum diverter valve
Faulty choke operation	Check choke and adjust as required
Exhaust system leak	repair exhaust system leak
Engine Detonation	
Ignition timing too far advanced	Reset ignition timing, See TUNE-UP
Faulty ignition system	Check ignition timing, See TUNE-UP
Spark plugs loose or faulty	Retighten or replace plugs
Fuel delivery system clogged	Inspect lines, pump and filter for clog
EGR valve inoperative	Replace EGR valve
PCV system inoperative	Inspect and/or replace hoses or valve
Vacuum leaks	Check vacuum system and repair leaks
Excessive combustion chamber deposits	Remove built-up deposits
Leaking, sticking or broken valves	Inspect and/or replace valves
External Oil Leakage	<u> </u>
Fuel pump improperly seated or worn gasket	Remove pump, replace gasket and seat properly
Oil pan gasket broken or pan bent	Straighten pan and replace gasket
Timing chain cover gasket broken	Replace timing chain cover gasket
Rear main oil seal worn	Replace rear main oil seal

Oil pan drain plug not seated properly	Remove and reinstall drain plus
Camshaft bearing drain hole blocked	Remove restriction
Oil pressure sending switch leaking	Remove and reinstall sending switch
Excessive Oil Consumption	1
Worn valve stems or guides	Replace stems or guides, Sec ENGINES
Valve "O" ring seals damaged	Replace "O" ring seals, See ENGINES
Plugged oil drain back holes	Remove restrictions
Improper PCV valve operation	Replace PCV valve
Engine oil level too high	Remove excess oi
Engine oil too thin	Replace thicker oi
Valve stem oil deflectors damaged	Replace oil deflectors
Incorrect piston rings	Replace piston rings, Sec ENGINES
Piston ring gaps not staggered	Reinstall piston rings, Sec ENGINES
Insufficient piston ring tension	Replace rings, See ENGINES
Piston ring grooves or oil return	slots clogged Replace pistor rings, See ENGINES
Piston rings sticking in grooves	Replace piston rings, Sec ENGINES
Piston ring grooves excessively worn	Replace piston and rings, Sec ENGINES
Compression rings installed upside down	Replace compression rings correctly, See ENGINES
Worn or scored cylinder walls	Rebore cylinders or replace
Mismatched oil ring expander and rail	Replace oil ring expander and rail, See ENGINES
Intake gasket dowels too long	Replace intake gasket dowels
Excessive main or connecting rod bearing clearance	Replace main or connecting rod bearings, See ENGINES
No Oil Pressure	
Low oil level	Add oil to proper leve
Oil pressure sender or gauge broken	Replace sender or gauge
Oil pump malfunction	Remove and overhaul oi pump, See ENGINES
Oil pressure relief valve sticking	Remove and reinstall valve
Oil pump passages blocked	Overhaul oil pump, Sec ENGINES

Oil pickup screen or tube blocked	Remove restriction
Loose oil inlet tube	Tighten oil inlet tube
Loose camshaft bearings	Replace camshaft bearings, See ENGINES
Internal leakage at oil passages	Replace block or cylinder head
Low Oil Pressure	
Low engine oil level	Add oil to proper level
Engine oil too thin	Remove and replace with thicker oil
Excessive oil pump clearance	Reduce oil pump clearance, See ENGINES
Oil pickup tube or screen blocked	Remove restrictions
Main, rod or cam bearing clearance excessive	Replace bearing to reduce clearance, See ENGINES
High Oil Pressure	•
Improper grade of oil	Replace with proper oil
Oil pressure relief valve stuck closed	Eliminate binding
Oil pressure sender or gauge faulty	Replace sender or gauge
Noisy Main Bearings	
Inadequate oil supply	Check oil delivery to main bearings
Excessive main bearing clearance	Replace main bearings, See ENGINES
Excessive crankshaft end play	Replace crankshaft, See ENGINES
Loose flywheel or torque converter	Tighten attaching bolts
Loose or damaged vibration damper	Tighten or replace vibration damper
Crankshaft journals out-of-round	Re-grind crankshaft journals
Excessive belt tension	Loosen belt tension
Noisy Connecting Rods	
Excessive bearing clearance or missing bearing	Replace bearing, See ENGINES
Crankshaft rod journal out-of-round	Re-grind crankshaft journal
Misaligned connecting rod or cap	Remove rod or cap and realign
Incorrectly tightened rod bolts	Remove and re-tighten rod bolts
Noisy Pistons and Rings	'
Excessive piston-to-bore clearance	Install larger pistons, See ENGINES
Bore tapered or out-of-round	Rebore block

Piston ring broken	Replace piston rings, See ENGINES
Piston pin loose or seized	Replace piston pin, See ENGINES
Connecting rods misaligned	Realign connecting rods
Ring side clearance too loose or tight	Replace with larger or smaller rings
Carbon build-up on piston	Remove carbon
Noisy Valve Train	
Worn or bent push rods	Replace push rods, See ENGINES
Worn rocker arms or bridged pivots	Replace push rods, See ENGINES
Dirt or chips in valve lifters	Remove lifters and remove dirt/chips
Excessive valve lifter leak-down	Replace valve lifters, See ENGINES
Valve lifter face worn	Replace valve lifters, See ENGINES
Broken or cocked valve springs	Replace or reposition springs
Too much valve stem-to-guide clearance	Replace valve guides, See ENGINES
Valve bent	Replace valve, See ENGINES
Loose rocker arms	Retighten rocker arms, See ENGINES
Excessive valve seat run-out	Reface valve seats, See ENGINES
Missing valve lock	Install new valve lock
Excessively worn camshaft lobes	Replace camshaft, See ENGINES
Plugged valve lifter oil holes	Eliminate restriction or replace lifter
Faulty valve lifter check ball	Replace lifter check ball, See ENGINES
Rocker arm nut installed upside down	Remove and reinstall correctly
Valve lifter incorrect for engine	Remove and replace valve lifters
Faulty push rod seat or lifter plunger	Replace plunger or push rod
Noisy Valves	·
Improper valve lash	Re-adjust valve lash, See ENGINES
Worn or dirty valve lifters	Clean and/or replace lifters
Worn valve guides	Replace valve guides, See ENGINES

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Excessive valve seat or face run-out	Reface seats or valve face
Worn camshaft lobes	Replace camshaft, See ENGINES
Loose rocker arm studs	Re-tighten rocker arm studs, See ENGINES
Bent push rods	Replace push rods, See ENGINES
Broken valve springs	Replace valve springs, See ENGINES
Burned,Sticking or Broken Valves	'
Weak valve springs or warped valves	Replace valves and/or springs, See ENGINES
Improper lifter clearance	Re-adjust clearance or replace lifters
Worn guides or improper guide clearance	Replace valve guides, See ENGINES
Out-of-round valve seats or improper seat width	Re-grind valve seats
Gum deposits on valve stems, seats or guide	Remove deposits
Improper spark timing	Re-adjust spark timing
Broken Pistons/Rings	
Undersize pistons	Replace with larger pistons, See ENGINES
Wrong piston rings	Replace with correct rings, See ENGINES
Out-of-round cylinder bore	Re-bore cylinder bore
Improper connecting rod alignment	Remove and realign connecting rods
Excessively worn ring grooves	Replace pistons, See ENGINES
Improperly assembled piston pins	Re-assemble pin-to-piston, See ENGINES
Insufficient ring gap clearance	Install new rings, See ENGINES
Engine overheating	Check cooling system
Incorrect ignition timing	Re-adjust ignition timing, See TUNE-UP
Excessive Exhaust Noise	1
Leaks at manifold to head, or to pipe	Replace manifold or pipe gasket
Exhaust manifold cracked or broken	Replace exhaust manifold, See ENGINES

ENGINE PERFORMANCE

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CARBURETOR TROUBLE SHOOTING:

NOTE:

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BASIC COLD START SYMPTOMS TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Start	
Choke not closing	Check choke operation, see FUEL SYSTEMS
Choke linkage bent	Check linkage, see FUEL SYSTEM
Engine Starts, Then Dies	
Choke vacuum kick setting too wide	Check setting and adjust see, FUEL SYSTEMS
Fast idle RPM too low	Reset RPM to specification, see TUNE-UP
Fast idle cam index incorrect	Reset fast idle cam index, see FUEL SYSTEMS
Vacuum leak	Inspect vacuum system for leaks
Low fuel pump outlet	Repair or replace pump, see FUEL SYSTEMS
Low carburetor fuel level	Check float setting see FUEL SYSTEM
Engine Quits Under Load	,
Choke vacuum kick setting incorrect	Reset vacuum kick setting,see FUEL SYSTEMS
Fast idle cam index incorrect	Reset fast idle cam index, see FUEL SYSTEM
Incorrect hot fast idle speed RPM	Reset fast idle RPM, see TUNE-UP
Engine Starts, Runs Up, Then Idles, Slowly With Black Sm	oke
Choke vacuum kick set too narrow	Reset vacuum kick, see FUEL SYSTEMS
Fast idle cam index incorrect	Reset fast idle cam index, see FUEL SYSTEMS
Hot fast idle RPM too low	Reset fast idle RPM, see TUNE-UP

BASIC HOT START SYMPTOMS TROUBLE SHOOTING CHART

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CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Start	
Engine flooded	Allow fuel to evaporate

BASIC COLD ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Stalls in Gear	
Choke vacuum kick setting incorrect	Reset choke vacuum kick, see FUEL SYSTEMS
Fast idle RPM incorrect	Reset fast idle RPM, see TUNE-UP
Fast idle cam index incorrect	Reset fast idle cam see FUEL SYSTEMS
Acceleration Sag or Stall	•
Defective choke control switch	Replace choke control switch
Choke vacuum kick setting incorrect	Reset choke vacuum kick see, FUEL SYSTEMS
Float level incorrect (too low)	Adjust float level, FUEL SYSTEMS
Accelerator pump defective	Repair or replace pump see FUEL SYSTEMS
Secondary throttles not closed	Inspect lockout adjustment, see FUEL SYSTEMS
Sag or Stall After Warmup	
Defective choke control switch	Replace choke control switch, see FUEL SYSTEMS
Defective accelerator pump	Replace pump, see FUEL SYSTEMS
Float level incorrect (too low)	Adjust float level, see FUEL SYSTEMS
Backfiring & Black Smoke	
Plugged heat crossover system	Remove restriction

BASIC WARM ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Hesitation With Small Amount of Gas Pedal Movement	·
Vacuum leak	Inspect vacuum lines
Accelerator pump weak or inoperable	Replace pump, see FUEL SYSTEMS
Float level setting too low	Reset float level, see,FUEL SYSTEMS
Metering rods sticking or binding	Inspect and/or replace rods, see FUEL SYSTEMS

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Carburetor idle or transfer system plugged	Inspect system and remove restriction
Frozen or binding heated air inlet	Inspect heated air door for binding
Hesitation With Heavy Gas Pedal Movement	
Defective accelerator pump	Replace pump, see FUEL SYSTEMS
Metering rod carrier sticking or binding	Remove restriction
Large vacuum leak	Inspect vacuum system and repair leak
Float level setting too low	Reset float level, see FUEL SYSTEMS
Defective fuel pump, lines or filter	Inspect pump, lines and filter
Air door setting incorrect	Adjust air door setting, see FUEL

DIESEL ENGINE TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any

unique situation or individual vehicle configuration. The purpose of this Trouble

Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT,

DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

NOTE: Diesel engines mechanical diagnosis is the same as gasoline engines for items

such as noisy valves, bearings, pistons, etc. The following trouble shooting

covers only items pertaining to diesel engines.

BASIC DIESEL ENGINE TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Crank	•
Bad battery connections or dead batteries	Check connections and/or replace batteries
Bad starter connections or bad starter	Check connections and/or replace starter
Engine Cranks Slowly, Won't Start	•
Bad battery connections or dead batteries	Check connections and/or replace batteries
Engine oil too heavy	Replace engine oil
Engine Cranks Normally, But Will Not Start	•
Glow plugs not functioning	Check glow plug system, see FUEL SYSTEMS
Glow plug control not functioning	Check controller, see FUEL SYSTEMS

Fuel not injected into cylinders	Check fuel injectors, see FUEL SYSTEMS
No fuel to injection pump	Check fuel delivery system
Fuel filter blocked	Replace fuel filter
Fuel tank filter blocked	Replace fuel tank filter
Fuel pump not operating	Check pump operation and/or replace pump
Fuel return system blocked	Inspect system and remove restriction
No voltage to fuel solenoid	Check solenoid and connections
Incorrect or contaminated fuel	Replace fuel
Incorrect injection pump timing	Re-adjust pump timing, see FUEL SYSTEMS
Low compression	Check valves, pistons, rings, see ENGINES
Injection pump malfunction	Inspect and/or replace injection pump
Engine Starts, Won't Idle	
Incorrect slow idle adjustment	Reset idle adjustment, see TUNE-UP
Fast idle solenoid malfunctioning	Check solenoid and connections
Fuel return system blocked	Check system and remove restrictions
Glow plugs go off too soon	See glow plug diagnosis in FUEL SYSTEMS
Injection pump timing incorrect	Reset pump timing, see FUEL SYSTEMS
No fuel to injection pump	Check fuel delivery system
Incorrect or contaminated fuel	Replace fuel
Low compression	Check valves, piston, rings, see ENGINES
Injection pump malfunction	Replace injection pump, see FUEL SYSTEMS
Fuel solenoid closes in RUN position	Check solenoid and connections
Engines Starts/Idles Rough W/out Smoke or Noise	Comisetions
Incorrect slow idle adjustment	Reset slow idle, see TUNE-UP
Injection line fuel leaks	Check lines and connections
Fuel return system blocked	Check lines and connections
Air in fuel system	Bleed air from system
Incorrect or contaminated fuel	Replace fuel
	1.001.000 1.001

Injector nozzle malfunction	Check nozzles, see FUEL SYSTEMS	
Engines Starts and Idles Rough W/out Smoke or Noise, But Clears After Warm-Up		
Injection pump timing incorrect	Reset pump timing, see FUEL SYSTEMS	
Engine not fully broken in	Put more miles on engine	
Air in system	Bleed air from system	
Injector nozzle malfunction	Check nozzles, see FUEL SYSTEMS	
Engine Idles Correctly, Misfires Above Idle		
Blocked fuel filter	Replace fuel filter	
Injection pump timing incorrect	Reset pump timing, see FUEL SYSTEMS	
Incorrect or contaminated fuel	Replace fuel	
Engine Won't Return To Idle		
Fast idle adjustment incorrect	Reset fast idle, see TUNE-UP	
Internal injection pump malfunction	Replace injection pump, see FUEL SYSTEMS	
External linkage binding	Check linkage and remove binding	
Fuel Leaks On Ground	1	
Loose or broken fuel line	Check lines and connections	
Internal injection pump seal leak	Replace injection pump, see FUEL SYSTEMS	
Cylinder Knocking Noise	,	
Injector nozzles sticking open	Test injectors, see FUEL SYSTEMS	
Very low nozzle opening pressure	Test injectors and/or replace	
Loss of Engine Power		
Restricted air intake	Remove restriction	
EGR valve malfunction	Replace EGR valve	
Blocked or damaged exhaust system	Remove restriction and/or	
	replace components	
Blocked fuel tank filter	Replace filter	
Restricted fuel filter	Remove restriction and/or	
	replace filter	
Block vent in gas cap	Remove restriction and/or replace cap	
Tank-to-injection pump fuel supply blocked	Check fuel lines and	
	connections	
Blocked fuel return system	Remove restriction	
Incorrect or contaminated fuel	Replace fuel	
Blocked injector nozzles	Check nozzle for blockage, see	

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	FUEL SYSTEMS
Low compression	Check valves, rings, pistons,
	see ENGINES
Loud Engine Noise With Black Smoke	
Basic timing incorrect	Reset timing, see FUEL
	SYSTEMS
EGR valve malfunction	Replace EGR valve
Internal injection pump malfunction	Replace injection pump, see
	FUEL SYSTEMS
Incorrect injector pump housing pressure	Check pressure, see FUEL
	SYSTEMS
Engine Overheating	
Cooling system leaks	Check cooling system and
	repair leaks
Belt slipping or damaged	Check tension and/or replace
	belt
Thermostat stuck closed	Remove and replace
	thermostat, see ENGINE
T 1 1 1 1 1 1	COOLING
Head gasket leaking	Replace head gasket
Oil Light on at Idle	
Low oil pump pressure	Check oil pump operation, see
	ENGINES
Oil cooler or line restricted	Remove restriction and/or
	replace cooler
Engine Won't Shut Off	
Injector pump fuel solenoid does not return fuel valve to OFF	Remove and check solenoid
position	and replace if needed

VACUUM PUMP DIAGNOSIS

CONDITION & POSSIBLE CAUSE	CORRECTION
Excessive Noise	·
Loose pump-to-drive assembly screws	Tighten screws
Loose tube on pump assembly	Tighten tube
Valves not functioning properly	Replace valves
Oil Leakage	
Loose end plug	Tighten end plug
Bad seal crimp	Remove and re-crimp seal

FUEL INJECTION TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble

GENERAL INFORMATION Trouble Shooting - Basic Procedures

Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC FUEL INJECTION TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Start (Cranks Normally)	·
Cold start valve inoperative	Test valve and circuit
Poor connection; vacuum or wiring	Check vacuum and electrical
	connections
Contaminated fuel	Test fuel for water or alcohol
Defective fuel pump relay or circuit	Test relay and wiring
Battery too low	Charge and test battery
Low fuel pressure	Test pressure regulator and fuel pump, check for restricted lines and filters
No distributor reference pulses	Repair ignition system as
	necessary
Open coolant temperature sensor circuit	Test sensor and wiring
Shorted W.O.T. switch in T.P.S.	Disconnect W.O.T. switch, engine should start
Defective ECM	Replace ECM
Fuel tank residual pressure valve leaks	Test for fuel pressure drop after shut down
Hard Starting	
Disconnected hot air tube to air cleaner	Reconnect tube and test
	control valve
Defective Idle Air Control (IAC) valve	Test valve operation and circuit
Shorted, open or misadjusted T.P.S.	Test and adjust or replace T.P.S.
EGR valve open	Test EGR valve and control circuit
Poor Oxygen sensor signal	Test for shorted or circuit
Incorrect mixture from PCV system	Test PCV for flow, check sealing of oil filter cap
Poor High Speed Operation	
Low fuel pump volume	Faulty pump or restricted fuel lines or filters
Poor MAP sensor signal	Test MAP sensor, vacuum hose and wiring
Poor Oxygen sensor signal	Test for shorted or open sensor or circuit

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Open coolant temperature sensor circuit	Test sensor and wiring
Faulty ignition operation	Check wires for cracks or poor
	con- nections, test secondary
	voltage with oscilloscope
Contaminated fuel	Test fuel for water or alcohol
Intermittent ECM ground	Test ECM ground connection
	for resistance
Restricted air cleaner	Replace air cleaner
Restricted exhaust system	Test for exhaust manifold
	back pressure
Poor MAF sensor signal	Check leakage between sensor
	and manifold
Poor VSS signal	If tester for ALCL hook-up is
	available check that VSS
	reading matches speedometer
Ping or Knock on Acceleration	
Poor Knock sensor signal	Test for shorted or open
	sensor or circuit
Poor Baro sensor signal	Test for shorted or open
	sensor or circuit
Improper ignition timing	See VEHICLE EMISSION
	CONTROL LABEL (where
	applicable)
Check for engine overheating problems	Low coolant, loose belts or
	electric cooling fan
	inoperative

NOTE:

For additional electronic fuel injection trouble shooting information, see the appropriate article in the ENGINE PERFORMANCE section (not all vehicles have Computer Engine Control articles). Information is provided there for diagnosing fuel system problems on vehicles with electronic fuel injection.

IGNITION SYSTEM TROUBLE SHOOTING

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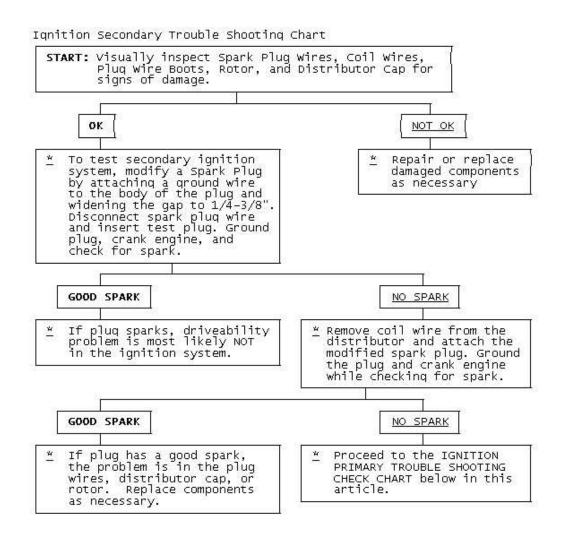
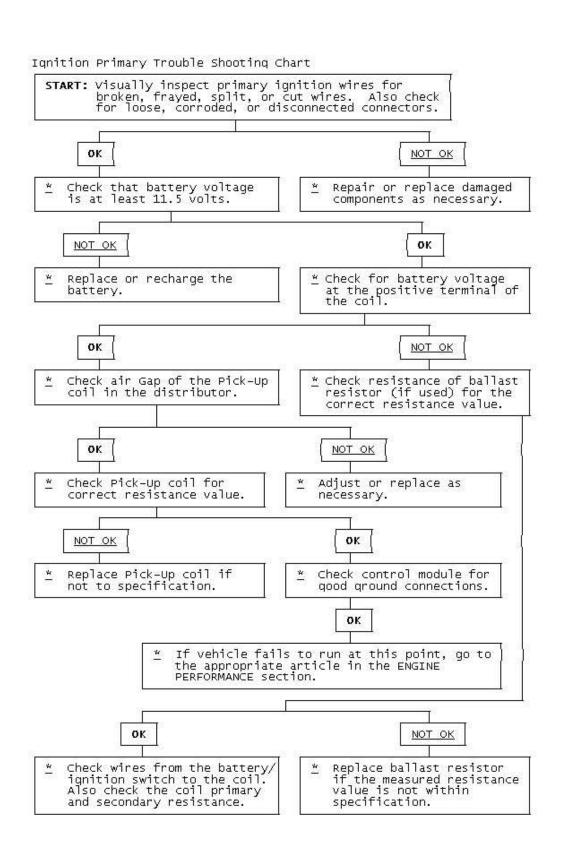


Fig. 3: Ignition Secondary Trouble Shooting Chart



GENERAL INFORMATION Trouble Shooting - Basic Procedures

Fig. 4: Ignition Primary Trouble Shooting Chart

STARTER TROUBLE SHOOTING

NOTE:

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BASIC STARTER TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Starter Fails to Operate	
Dead battery or bad connections between starter and battery	Check battery charge and all wires and connections to starter
Ignition switch faulty or misadjusted	Adjust or replace ignition switch
Open circuit between starter switch ignition terminal on starter relay	Check and repair wires and connections as necessary
Starter relay or starter defective	See Testing in STARTER article
Open solenoid pull-in wire	See Testing in STARTER article
Starter Does Not Operate and Headlights Dim	
Weak battery or dead cell	Charge or replace battery as necessary
Loose or corroded battery connections	Check that battery connections are clean and tight
Internal ground in starter windings	See Testing in STARTER article
Grounded starter fields	See Testing in STARTERS
Armature rubbing on pole shoes	See STARTER article
Starter Turns but Engine Does Not Rotate	
Starter clutch slipping	See STARTER article
Broken clutch housing	See STARTER article
Pinion shaft rusted or dry	See STARTER article
Engine basic timing incorrect	See Ignition Timing in TUNE-UP article
Broken teeth on engine flywheel	Replace flywheel and check for starter pinion gear damage
Starter Will Not Crank Engine	

Faulty overrunning clutch	See STARTER article
Broken clutch housing	See STARTER article
Broken flywheel teeth	Replace flywheel and check
	for starter pinion gear
	damage
Armature shaft sheared or reduction gear teeth stripped	See STARTER article
Weak battery	Charge or replace battery as
	necessary
Faulty solenoid	See On-Vehicle Tests in
	STARTER article
Poor grounds	Check all ground connections
	for tight and clean
Tanikian anikal Carles an mia diaretad	connections
Ignition switch faulty or misadjusted	Adjust or replace ignition switch as necessary
Storter Crenka Engine Slovyky	Switch as necessary
Starter Cranks Engine Slowly	Charge on monless bottoms of
Battery weak or defective	Charge or replace battery as necessary
Engine overheated	See ENGINE COOLING
Eligine overheated	SYSTEM article
Engine oil too heavy	Check that proper viscosity
Linguic on too heavy	oil is used
Poor battery-to-starter connections	Check that all between
1 oor buttery to starter connections	battery and starter are clean
	and tight
Current draw too low or too high	See Bench Tests in
	STARTER article
Bent armature, loose pole shoes screws or worn bearings	See STARTER article
Burned solenoid contacts	Replace solenoid
Faulty starter	Replace starter
Starter Engages Engine Only Momentarily	
Engine timing too far advanced	See Ignition Timing in
	TUNE-UP article
Overrunning clutch not engaging properly	Replace overrunning clutch.
	See STARTER article
Broken starter clutch	See STARTER article
Broken teeth on engine flywheel	Replace flywheel and check
	starter pinion gear for
	damage
Weak drive assembly thrust spring	See STARTER article
Weak hold-in coil	See Bench Tests in
	STARTER article
Starter Drive Will Not Engage	
Defective point assembly	See Testing in STARTER

	article
Poor point assembly ground	See Testing in STARTER
	article
Defective pull-in coil	Replace starter solenoid
Starter Relay Does Not Close	
Dead battery	Charge or replace battery as
	necessary
Faulty wiring	Check all wiring and
	connections leading to relay
Neutral safety switch faulty	Replace neutral safety switch
Starter relay faulty	Replace starter relay
Starter Drive Will Not Disengage	
Starter motor loose on mountings	Tighten starter attach bolts
Worn drive end bushing	See STARTER article
Damaged engine flywheel teeth	Replace flywheel and starter
	pinion gear for damage
Drive yolk return spring broken or missing	Replace return spring
Faulty ignition switch	Replace ignition switch
Insufficient clearance between winding leads to solenoid terminal	Replace starter solenoid
and main contact in solenoid	
Starter clutch not disengaging	Replace starter clutch
Ignition starter switch contacts sticking	Replace ignition switch
Starter Relay Operates but Solenoid Does Not	
Faulty solenoid switch, switch connections or relay	Check all wiring between
	relay and solenoid or replace
	relay or solenoid as necessary
Broken lead or loose soldered connections	Repair wire or wire
	connections as necessary
Solenoid Plunger Vibrates When Switch is Engaged	
Weak battery	Charge or replace battery as
	necessary
Solenoid contacts corroded	Clean contacts or replace
	solenoid
Faulty wiring	Check all wiring leading to
	solenoid
Broken connections inside switch cover	Repair connections or replace
On such all in sains	solenoid
Open hold-in wire	Replace solenoid
Low Current Draw	
Worn brushes or weak	Replace brushes or brush
Wish Divided Wiking Decilio C. 11. D.C. E. 1. E. 1. E. 1.	springs as necessary
High Pitched Whine During Cranking Before Engine Fires but Engine F	
Distance too great between starter pinion and flywheel	Align starter or check that

GENERAL INFORMATION Trouble Shooting - Basic Procedures

	correct starter and flywheel are being used	
High Pitched Whine After Engine Fires With Key released. Engine Fires and Cranks Normally		
Distance too small between starter pinion and flywheel	Flywheel runout contributes	
	to the intermittent nature	

TUNE-UP TROUBLE SHOOTING - GAS ENGINE VEHICLES

NOTE:

This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

CODDECTION

BASIC SPARK PLUG TROUBLE SHOOTING CHARTS

CONDITION & DOCCIDI E CALICE

CONDITION & POSSIBLE CAUSE	CORRECTION
Normal Spark Plug Condition	
Light Tan or Gray deposits	No Action
Electrode not burned or fouled	No Action
Gap tolerance not changed	No Action
Cold Fouling or Carbon Deposits	
Overrich air/fuel mixture	Adjust air/fuel mixture, see ENGINE PERFORMANCE section
Faulty choke	Replace choke assembly, see ENGINE PERFORMANCE section
Clogged air filter	Clean and/or replace air filter
Incorrect idle speed or dirty carburetor	Reset idle speed and/ or clean carburetor
Faulty ignition wires	Replace ignition wiring
Prolonged operation at idle	Shut engine off during long idle
Sticking valves or worn valve guide seals	Check valve train
Wet Fouling or Oil Deposits	
Worn rings and pistons	Install new rings and pistons
Excessive cylinder wear	Rebore or replace block
Excessive valve guide clearance	Worn or loose bearing
Gap Bridged	
Deposits in combustion chamber becoming fused to electrode	Clean combustion chamber of deposits
Blistered Electrode	
Engine overheating	Check cooling system

GENERAL INFORMATION Trouble Shooting - Basic Procedures

Wrong type of fuel	Replace with correct fuel
Loose spark plugs	Retighten spark plugs
Over-advanced ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Pre-Ignition or Melted Electrodes	
Incorrect type of fuel	Replace with correct fuel
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Burned valves	Replace valves
Engine Overheating	Check cooling system
Wrong type of spark plug, too hot	Replace with correct spark plug, see ENGINE PERFORMANCE
Chipped Insulators	
Severe detonation	Check for over-advanced timing or combustion
Improper gapping procedure	Re-gap spark plugs
Rust Colored Deposits	
Additives in unleaded fuel	Try different fuel brand
Water In Combustion Chamber	
Blown head gasket or cracked head	Repair or replace head or head gasket

NOTE:

Before diagnosing an electronic ignition system, ensure that all wiring is connected properly between distributor, wiring connector and spark plugs. Ignition problem will show up either as: Engine Will Not Start or Engine Runs Rough.

BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS

CONDITION & POSSIBLE CAUSE	CORRECTION
Engine Won't Start	
Open circuit between distributor and bulkhead connector	Repair circuit
Open circuit between bulkhead connector and ignition switch	Repair circuit
Open circuit between ignition switch and starter solenoid	Repair circuit
Engine Runs Rough	
Fuel lines leaking or clogged	Tighten fitting, remove
	restriction
Initial timing incorrect	Reset ignition timing see
	ENGINE PERFORMANCE
Centrifugal advance malfunction	Repair distributor advance
Defective spark plugs or wiring	Replace plugs or plug wiring
Component Failure	
Spark arc-over on cap, rotor or coil	Replace cap, rotor or or coil

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Defective pick-up coil	Replace pick-up coil
Defective ignition coil	Replace ignition coil
Defective vacuum unit	Replace vacuum unit
Defective control module	Replace control module

BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS - USING OSCILLOSCOPE PATTERNS

CONDITION & POSSIBLE CAUSE	CORRECTION
Firing Voltage Lines are the Same, but Abnormally High	
Retarded ignition timing	Reset ignition timing, see ENGINE PERFORMANCE
	section
Fuel mixture too lean	Readjust carburetor, see ENGINE PERFORMANCE
High resistance in coil wire	Replace coil wire
Corrosion in coil tower terminal	Clean and/or replace coil
Corrosion in distributor coil terminal	Clean and/or replace distributor cap
Firing Voltage Lines are the Same but Abnormally Low	,
Fuel mixture too rich	Readjust carburetor, see ENGINE PERFORMANCE
Breaks in coil wire causing arcing	Replace coil wire
Cracked coil tower causing arcing	Replace coil
Low coil output	Replace coil
Low engine compression	Determine cause and repair
One or More, But Not All Firing Voltage Lines are Higher T	Than Others
Carburetor idle mixture not balanced	Readjust carburetor, see ENGINE PERFORMANCE
EGR valve stuck open	Clean and/or replace valve
High resistance in spark plug wires	Replace spark plug wires
Cracked or broken spark plug insulator	Replace spark plugs
Intake vacuum leak	Repair leak
Defective spark plugs	Replace spark plugs
Corroded spark plug terminals	Replace spark plugs
One or More, But Not All Firing Voltage Lines Are Lower T	Than Others
Curb idle mixture not balanced	Readjust carburetor, see ENGINE PERFORMANCE
Breaks in plug wires	Replace plug wires causing arcing
Cracked coil tower causing arcing	Replace coil
Low compression	Determine cause and repair
Defective spark plugs	Replace spark plugs

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Corroded spark plugs	Replace spark plugs	
Cylinders Not Firing		
Cracked distributor cap terminals	Replace distributor cap	
Shorted spark plug wire	Determine cause and repair	
Mechanical problem in engine	Determine cause and repair	
Defective spark plugs	Replace spark plugs	
Spark plugs fouled	Replace spark plugs	

BASIC DRIVEABILITY PROBLEMS TROUBLE SHOOTING

CONDITION & POSSIBLE CAUSE	CORRECTION
Hard Starting	
Binding carburetor linkage	Eliminate binding
Binding choke linkage	Eliminate binding
Binding choke piston	Eliminate binding
Restricted choke vacuum	Check vacuum lines for blockage
Worn or dirty needle valve and seat	Clean carburetor, see ENGINE PERFORMANCE
Float sticking	Readjust or replace float see the ENGINE PERFORMANCE section
Incorrect choke adjustment	Reset choke adjustment see ENGINE PERFORMANCE
Defective coil	Replace coil
Improper spark plug gap	Regap spark plugs
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Detonation	•
Over-advanced ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Defective spark plugs	Replace spark plugs
Fuel lines clogged	Clean fuel lines
EGR system malfunction	Check and repair EGR system
PCV system malfunction	Repair PCV system
Vacuum leaks	Check and repair vacuum system
Loose fan belts	Tighten or replace fan belts, see ENGINE PERFORMANCE
Restricted airflow	Remove restriction
Vacuum advance malfunction	Check distributor operation
Dieseling	-
Binding carburetor linkage	Eliminate binding

Binding throttle linkage	Eliminate blinding
Binding choke linkage or fast idle cam	Eliminate binding
Defective idle solenoid	Replace idle solenoid see ENGINE PERFORMANCE
Improper base idle speed	Reset idle speed, see see ENGINE PERFORMANCE
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Incorrect idle mixture setting	Reset idle mixture, see ENGINE PERFORMANCE
Faulty Acceleration	·
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Engine cold and choke too lean	Adjust choke and allow engine to warm-up
Defective spark plugs	Replace spark plugs
Defective coil	Replace coil
Faulty Low Speed Operation	·
Clogged idle transfer slots	Clean idle transfer slots, see FUEL
Restricted idle air bleeds and passages	Disassemble and clean carburetor, see FUEL
Clogged air cleaner	Replace air filter
Defective spark plugs	Replace spark plugs
Defective ignition wires	Replace ignition wire see ENGINE PERFORMANCE
Defective distributor cap	Replace distributor cap
Faulty High Speed Operation	
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Defective distributor centrifugal advance	Replace advance mechanism
Defective distributor vacuum advance	Replace advance unit
Incorrect spark plugs or plug gap	Check gap and/or replace spark plugs
Faulty choke operation	Check choke and repair as required
Clogged vacuum passages	Remove restrictions
Improper size or clogged main jet	Check jet size and clean, see FUEL
Restricted air cleaner	Check filter and replace as necessary
Defective distributor cap, rotor or coil	Replace cap, rotor or coil
Misfire at All Speeds	1 1/

Defective spark plugs	Replace spark plugs
Defective spark plug wires	Replace spark plug wires
Defective distributor cap, rotor, or coil	Replace cap, rotor, or coil
Cracked or broken vacuum hoses	Replace vacuum hoses
Vacuum leaks	Repair vacuum leaks
Fuel lines clogged	Remove restriction
Hesitation	
Cracked or broken vacuum	Replace vacuum hoses hoses
Vacuum leaks	Repair Vacuum leaks
Binding carburetor linkage	Eliminate binding
Binding throttle linkage	Eliminate binding
Binding choke linkage or fast idle cam	Eliminate binding
Improper float setting	Readjust float setting, see FUEL
Cracked or broken ignition wires	Replace ignition wires
Rough Idle, Missing or Stalling	1 1
Incorrect curb idle or fast idle speed	Reset idle speed, see see ENGINE PERFORMANCE
Incorrect basic timing	Reset ignition timing see ENGINE PERFORMANCE
Improper idle mixture adjustment	Reset idle mixture, see ENGINE PERFORMANCE
Improper feedback system operation	Check feedback system see ENGINE PERFORMANCE
Incorrect spark plug gap	Reset spark plug gap, see ENGINE PERFORMANCE
Moisture in ignition components	Dry components
Loose or broken ignition wires	Replace ignition wires
Damaged distributor cap or or rotor	Replace distributor cap or rotor
Faulty ignition coil	Replace ignition coil
Fuel filter clogged or worn	Replace fuel filter
Damaged idle mixture screw	Replace idle mixture screw, see FUEL
Improper fast idle cam adjustment	Reset fast idle cam adjustment, see TUNE- see ENGINE PERFORMANCE
Improper EGR valve operation	Replace EGR valve
Faulty PCV valve air flow	Replace PCV valve
Choke binding or improper choke setting	Reset choke or eliminate binding
Vacuum leak	Repair vacuum leak
Improper float bowl fuel level	Reset float adjustment, see

	FUEL
Clogged air bleed or idle passages	Clean carburetor passages, see FUEL
Clogged or worn air cleaner filter	Replace air filter
Faulty choke vacuum diaphragm	Replace diaphragm, see ENGINE PERFORMANCE
Exhaust manifold heat valve inoperative	Replace heat valve
Improper distributor spark advance	Check distributor operation
Leaking valves or valve components	Check and repair valvetrain
Improper carburetor mounting	Remove and remount carburetor
Excessive play in distributor shaft	Replace distributor
Loose or corroded wiring connections	Repair or replace as required
Engine Surges	
Improper PCV valve airflow	Replace PCV valve
Vacuum leaks	Repair vacuum leaks
Clogged air bleeds	Remove restriction
EGR valve malfunction	Replace EGR valve
Restricted air cleaner filter	Replace air filter
Cracked or broken vacuum hoses	Replace vacuum hoses
Cracked or broken ignition wires	Replace ignition wires
Vacuum advance malfunction	Check unit and replace as necessary
Defective or fouled spark plugs	Replace spark plugs
Ping or Spark Knock	, , , , , , ,
Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Distributor centrifugal or vacuum advance malfunction	Check operation and replace as necessary
Carburetor setting too lean	Readjust mixture setting, see ENGINE PERFORMANCE
Vacuum leak	Eliminate vacuum leak
EGR valve malfunction	Replace EGR valve
Poor Gasoline Mileage	
Cracked or broken vacuum	Replace vacuum hoses hoses
Vacuum leaks	Repair vacuum leaks
Defective ignition wires	Replace wires
Incorrect choke setting	Readjust setting, see ENGINE PERFORMANCE
Defective vacuum advance	Replace vacuum advance
Defective spark plugs	Replace spark plugs

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GENERAL INFORMATION	DN Trouble Shooting - Basic Procedures

Dirt in carburetor jets	Clean and/or replace jets
Incorrect float adjustment	Readjust float setting, see
	FUEL
Defective power valve	Replace power valve, see
	ENGÎNE PERFORMANCE
Incorrect idle speed	Readjust idle speed
Engine Stalls	
Improper float level	Readjust float level
Leaking needle valve and seat	Replace needle valve and seat
Vacuum leaks	Eliminate vacuum leaks

VACUUM PUMP - DIESEL TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any

unique situation or individual vehicle configuration. The purpose of this Trouble

Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT,

DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

NOTE: Diesel engines mechanical diagnosis is the same as gasoline engines for items

such as noisy valves, bearings, pistons, etc. The following trouble shooting

covers only items pertaining to diesel engines.

VACUUM PUMP (DIESEL) TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Excessive Noise	·
Loose pump-to-drive assembly screws	Tighten screws
Loose tube on pump assembly	Tighten tube
Valves not functioning properly	Replace valves
Oil Leakage	·
Loose end plug	Tighten end plug
Bad seal crimp	Remove and re-crimp
	seal

MANUAL TRANSMISSION

MANUAL TRANSMISSION TROUBLE SHOOTING

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MANUAL TRANSMISSION/TRANSAXLE TROUBLE SHOOTING

Condition	Possible Cause
Noisy In Forward Gears	Low gear oil level, Loose bell housing bolts, Worn
	bearings or gears
Clunk On Deceleration (FWD Only)	Loose engine mounts, Worn inboard CV joints,
	Worn differential pinion shaft, Side gear hub
	counterbore in case worn oversize
Gear Clash When Shifting Forward Gears	Clutch Out Of Adjustment, Shift linkage damaged
	or out of adjustment, Gears or synchronizers
	damaged, Low gear oil level
Transmission Noisy When Moving (RWD Only)	Worn rear outputshaft bearing
Quiet In Neutral With Clutch Engaged	
Gear Rattle	Worn bearings, Wrong gear oil, Low gear oil, Worn
G. I. T. I. A. III. G. MILL D. D. O.	gears
Steady Ticking At Idle (Increases With RPM)	Broken tooth on gear
Gear Clash When Shifting Forward Gears	Worn or broken synchronizers
Loud Whine In Reverse	Normal condition ⁽¹⁾
Noise When Stepping On Clutch	Bad release bearing, Worn pilot bearing
Ticking Or Screeching As Clutch Is Engaged	Faulty release bearing, Uneven pressure plate fingers
Click Or Snap When Clutch Is Engaged	Worn clutch fork, Worn or broken front bearing
	retainer
Transmission Shifts Hard	Clutch not releasing, Shift mechanism binding,
	Clutch installed backwards
Will Not Shift Into One Gear, Shifts Into All Others	Bent shift fork, Worn detent balls
Locked Into Gear, Cannot Shift	Clutch adjustment, Worn detent balls
Transmission Jumps Out Of Gear	Pilot bearing worn, Bent shift fork, Worn gear teeth
	or face, Excessive gear train end play, Worn
	synchronizers, Missing detent ball spring, Shift
	mechanism worn or out of adjustment, Engine or
	transmission mount bolts loose or out of adjustment,
clicat D wi	Transmission not aligned
Shift Lever Rattle	Worn shift lever or detents, Worn shift forks, Worn synchronizers sleeve
Shift Layer Hong Under Assolutation	-
Shift Lever Hops Under Acceleration	Worn engine or transmission mounts
(1) Most units use spur cut gears in reverse and are n	oisy

POWERTRAIN

NOTE:

CLUTCH TROUBLE SHOOTING

This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble

GENERAL INFORMATION Trouble Shooting - Basic Procedures

Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC CLUTCH TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Chattering or Grabbing	
Incorrect clutch adjustment	Adjust clutch
Oil, grease or glaze on facings	Disassemble and clean or replace
Loose "U" joint flange	See DRIVE AXLES article
Worn input shaft spline	Replace input shaft
Binding pressure plate	Replace pressure plate
Binding release lever	See CLUTCH article
Binding clutch disc hub	Replace clutch disc
Unequal pressure plate contact	Replace worn/misaligned components
Loose/bent clutch disc	Replace clutch disc
Incorrect transmission alignment	Realign transmission
Worn pressure plate, disc or flywheel	Replace damaged components
Broken or weak pressure springs	Replace pressure plate
Sticking clutch pedal	Lubricate clutch pedal & linkage
Incorrect clutch disc facing	Replace clutch disc
Engine loose in chassis	Tighten all mounting bolts
Failure to Release	
Oil or grease on clutch facings	Clean or replace clutch clutch disc
Incorrect release lever or pedal adjustment	See CLUTCH article
Worn or broken clutch facings	Replace clutch disc
Bent clutch disc or pressure plate	Replace damaged components
Clutch disc hub binding on input shaft	Clean or replace clutch disc and/or input shaft
Binding pilot bearing	Replace pilot bearing
Sticking release bearing sleeve	Replace release bearing and/or sleeve
Binding clutch cable	See CLUTCH article
Defective clutch master	Replace master cylinder
Defective clutch slave	Replace slave cylinder
Air in hydraulic system	Bleed hydraulic system
Rattling	
Weak or broken release lever spring	Replace spring and check alignment
Damaged pressure plate	Replace pressure plate

Broken clutch return spring	Replace return spring
Worn splines on clutch disc or input shaft	Replace clutch disc and/or input
	shaft
Worn clutch release bearing	Replace release bearing
Dry or worn pilot bearing	Lubricate or replace pilot bearing
Unequal release lever contact	Align or replace release lever
Incorrect pedal free play	Adjust free play
Warped or damaged clutch disc	Replace damaged components
Slipping	
Pressure springs worn or	Release pressure plate
Oily, greasy or worn facings	Clean or replace clutch disc
Incorrect clutch alignment	Realign clutch assembly
Warped clutch disc or pressure plate	Replace damaged components
Binding release levers or clutch pedal	Lubricate and/or replace release
	components
Squeaking	
Worn or damaged release	Replace release bearing
Dry or worn pilot or release bearing	Lubricate or replace assembly
Pilot bearing turning in crankshaft	Replace pilot bearing and/or
	crankshaft
Worn input shaft bearing	Replace bearing and seal
Incorrect transmission alignment	Realign transmission
Dry release fork between pivot	Lubricate release fork and pivot
Heavy and/or Stiff Pedal	
Sticking release bearing sleeve	Replace release bearing and/or sleeve
Dry or binding clutch pedal hub	Lubricate and align components
Floor mat interference with pedal	Lay mat flat in proper area
Dry or binding ball/fork pivots	Lubricate and align components
Faulty clutch cable	Replace clutch cable
Noisy Clutch Pedal	1
Faulty interlock switch	Replace interlock switch
Self-adjuster ratchet noise	Lubricate or replace self-adjuster
Speed control interlock switch	Lubricate or replace interlock
1	switch
Clutch Pedal Sticks Down	1
Binding clutch cable	See CLUTCH article
Springs weak in pressure plate	Replace pressure plate
Binding in clutch linkage	Lubricate and free linkage
Noisy	10.
Dry release bearing	Lubricate or replace release bearing

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Dry or worn pilot bearing	Lubricate or replace bearing
Worn input shaft bearing	Replace bearing
Transmission Click	
Weak springs in pressure	Replace pressure plate plate
Release fork loose on ball stud	Replace release fork and/or ball stud
Oil on clutch disc damper	Replace clutch disc
Broken spring in slave cylinder	Replace slave cylinder

DRIVE AXLE - NOISE DIAGNOSIS

Unrelated Noises

Some driveline trouble symptoms are also common to the engine, transmission, wheel bearings, tires, and other parts of the vehicle. Ensure cause of trouble actually is in the drive axle before adjusting, repairing, or replacing any of its parts.

Non-Drive Axle Noises

A few conditions can sound just like drive axle noise and have to be considered in pre-diagnosis. The 4 most common noises are exhaust, tires, CV/universal joints and wheel trim rings.

In certain conditions, the pitch of the exhaust gases may e gear whine. At other times, it may be mistaken for a wheel bearing rumble.

Tires, especially radial and snow, can have a high-pitched tread whine or roar, similar to gear noise. Also, some non-standard tires with an unusual tread construction may emit a roar or whine.

Defective CV/universal joints may cause clicking noises or excessive driveline play that can be improperly diagnosed as drive axle problems.

Trim and moldings also can cause a whistling or whining noise. Ensure none of these components are causing the noise before disassembling the drive axle.

Gear Noise

A "howling" or "whining" noise from the ring and pinion gear can be caused by an improper gear pattern, gear damage, or improper bearing preload. It can occur at various speeds and driving conditions, or it can be continuous.

Before disassembling axle to diagnose and correct gear ke sure that tires, exhaust, and vehicle trim have been checked as possible causes.

Chuckle

This is a particular rattling noise that sounds like a stick against the spokes of a spinning bicycle wheel. It occurs while decelerating from 40 MPH and usually can be heard until vehicle comes to a complete stop. The

GENERAL INFORMATION Trouble Shooting - Basic Procedures

frequency varies with the speed of the vehicle.

A chuckle that occurs on the driving phase is usually caused ive clearance due to differential gear wear, or by a damaged tooth on the coast side of the pinion or ring gear. Even a very small tooth nick or a ridge on the edge of a gear tooth is enough the cause the noise.

This condition can be corrected simply by cleaning the gear tooth nick or ridge with a small grinding wheel. If either gear is damaged or scored badly, the gear set must be replaced. If metal has broken loose, the carrier and housing must be cleaned to remove particles that could cause damage.

Knock

This is very similar to a chuckle, though it may be louder, and occur on acceleration or deceleration. Knock can be caused by a gear tooth that is damaged on the drive side of the ring and pinion gears. Ring gear bolts that are hitting the carrier casting can cause knock. Knock can also be due to excessive end play in the axle shafts.

Clunk

Clunk is a metallic noise heard when an automatic transmission is engaged in Reverse or Drive, or when throttle is applied or released. It is caused by backlash somewhere in the driveline, but not necessarily in the axle. To determine whether driveline clunk is caused by the axle, check the total axle backlash as follows:

- 1. Raise vehicle on a frame or twinpost hoist so that drive wheels are free. Clamp a bar between axle companion flange and a part of the frame or body so that flange cannot move.
- 2. On conventional drive axles, lock the left wheel to keep it from turning. On all models, turn the right wheel slowly until it is felt to be in Drive condition. Hold a chalk marker on side of tire about 12" from center of wheel. Turn wheel in the opposite direction until it is again felt to be in Drive condition.
- 3. Measure the length of the chalk mark, which is the total axle backlash. If backlash is one inch or less, drive axle is not the source of clunk noise.

Bearing Whine

Bearing whine is a high-pitched sound similar to a whistle. It is usually caused by malfunctioning pinion bearings. Pinion bearings operate at drive shaft speed. Roller wheel bearings may whine in a similar manner if they run completely dry of lubricant. Bearing noise will occur at all driving speeds. This distinguishes it from gear whine, which usually comes and goes as speed changes.

Bearing Rumble

Bearing rumble sounds like marbles being tumbled. It is usually caused by a malfunctioning wheel bearing. The lower pitch is because the wheel bearing turns at only about 1/3 of drive shaft speed.

Chatter On Turns

This is a condition where the entire front or rear of vehicle vibrates when vehicle is moving. The vibration is plainly felt as well as heard. Extra differential thrust washers installed during axle repair can cause a condition of partial lock-up that creates this chatter.

GENERAL INFORMATION Trouble Shooting - Basic Procedures

Axle Shaft Noise

Axle shaft noise is similar to gear noise and pinion bearing whine. Axle shaft bearing noise will normally distinguish itself from gear noise by occurring in all driving modes (Drive, cruise, coast and float), and will persist with transmission in Neutral while vehicle is moving at problem speed.

If vehicle displays this noise condition, remove suspect parts, replace wheel seals and install a new set of bearings. Re-evaluate vehicle for noise before removing any internal components.

Vibration

Vibration is a high-frequency trembling, shaking or grinding condition (felt or heard) that may be constant or variable in level and can occur during the total operating speed range of the vehicle.

The types of vibrations that can be felt in the vehicle can d into 3 main groups:

- Vibrations of various unbalanced rotating parts of the vehicle.
- Resonance vibrations of the body and frame structures caused by rotating of unbalanced parts.
- Tip-in moans of resonance vibrations from stressed engine or exhaust system mounts or driveline flexing modes.

DRIVE AXLE - RWD TROUBLE SHOOTING

NOTE:

This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing. For definitions of listed noises or sounds, see DRIVE AXLE - NOISE DIAGNOSIS under POWERTRAIN.

DRIVE AXLE (RWD) TROUBLE SHOOTING

DRIVE AALE (RWD) TROUBLE SHOOTING	
CONDITION & POSSIBLE CAUSE	CORRECTION
Knocking or Clunking	•
Differential Side Gear Clearance	Check Clearance
Worn Pinion Shaft	Replace Pinion Shaft
Axle Shaft End Play	Check End Play
Missing Gear Teeth	Check Differential/Replace Gear
Wrong Axle Backlash	Check Backlash
Misaligned Driveline	Realign Driveline
Clinking During Engagement	
Side Gear Clearance	Check Clearance
Ring and Pinion Backlash	Check Backlash
Worn/Loose Pinion Shaft	Replace Shaft/Bearing
	i e e e e e e e e e e e e e e e e e e e

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Bad "U" Joint	Replace "U" Joint
Sticking Slip Yoke	Lube Slip Yoke
Broken Rear Axle Mount	Replace Mount
Loose Drive Shaft Flange	Check Flange
Click/Chatter On Turns	
Differential Side Gear Clearance	Check Clearance
Wrong Turn On Plates (1)	Replace Clutch Plates
Wrong Differential Lubricant (1)	Change Lubricant
Knock Or Click	
Flat Spot on Rear Wheel Bearing	Replace Wheel Bearing
Low Vibration At All Speeds	·
Faulty Wheel Bearing	Replace Wheel Bearing
Faulty "U" Joint	Replace "U" Joint
Faulty Drive Shaft	Balance Drive Shaft
Faulty Companion Flange	Replace Flange
Faulty Slip Yoke Flange	Replace Flange
(1) Limited slip differential only.	

FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING

NOTE:

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BASIC FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE
Grease Leaks	CV boot torn or cracked
Clicking Noise on Cornering	Damaged outer CV
Clunk Noise on Acceleration	Damaged inner CV
Vibration or Shudder on Acceleration	Sticking, damaged or worn CV Misalignment or
	spring height

STEERING & SUSPENSION

MANUAL STEERING GEAR TROUBLE SHOOTING

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BASIC MANUAL STEERING GEAR TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Rattle or Chucking Noise in Rack and Pinion	
Rack and pinion mounting bracket loose	Tighten all mounting bolts
Lack of/or incorrect lubricant	Correct as necessary
Steering gear mounting bolts loose	Tighten all mounting bolts
Excessive Play	•
Front wheel bearing improperly adjusted	See FRONT SUSPENSION article
Loose or worn steering linkage	See STEERING LINKAGE article
Loose or worn steering gear shift	See MANUAL STEERING GEAR article
Steering arm loose on gear shaft	See MANUAL STEERING GEAR article
Steering gear housing bolts loose	Tighten all mounting bolts
Steering gear adjustment too loose	See MANUAL STEERING GEAR article
Steering arms loose on knuckles	Tighten and check steering linkage
Rack and pinion mounting loose	Tighten all mounting bolts
Rack and pinion out of adjustment	See adjustment in STEERING article
Tie rod end loose	Tighten and check steering linkage
Excessive Pitman shaft-to-ball nut lash	Repair as necessary
Poor Returnability	
Lack of lubricant in ball joint or linkage	Lubricate and service systems
Binding in linkage or ball joints	See STEERING LINKAGE and SUSPENSION article
Improper front end alignment	See WHEEL ALIGNMENT article
Improper tire pressure	Inflate to proper pressure
Tie rod binding	Inflate to proper pressure
Shaft seal rubbing shaft	See STEERING COLUMN article
Excessive Vertical Motion	•
Improper tire pressure	Inflate to proper pressure
Tires, wheels or rotors out of balance	Balance tires then check wheels and rotors
Worn or faulty shock absorbers	Check and replace if necessary

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Loose tie rod ends or steering	Tighten or replace if necessary	
Loose or worn wheel bearings	See SUSPENSION article	
Steering Pulls to One Side		
Improper tire pressure	Inflate to proper pressure	
Front tires are different sizes	Rotate or replace if necessary	
Wheel bearings not adjusted properly	See FRONT SUSPENSION article	
Bent or broken suspension components	See FRONT SUSPENSION article	
Improper wheel alignment	See WHEEL ALIGNMENT article	
Brakes dragging	See BRAKES article	
Instability		
Low or uneven tire pressure	Inflate to proper pressure	
Loose or worn wheel bearings	See FRONT SUSPENSION	
	article	
Loose or worn idler arm bushing	See FRONT SUSPENSION article	
Loose or worn strut bushings	See FRONT SUSPENSION article	
Incorrect front wheel alignment	See WHEEL ALIGNMENT article	
Steering gear not centered	See MANUAL STEERING GEARS article	
Springs or shock	Check and replace if necessary	
Improper cross shaft	See MANUAL STEERING GEARS article	

POWER STEERING TROUBLE SHOOTING

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BASIC POWER STEERING TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Rattle or Chucking Noise	
Pressure hoses touching engine parts	Adjust to proper clearance
Loose Pitman shaft	Adjust or replace if necessary
Tie rods ends or Pitman arm loose	Tighten and check system
Rack and pinion mounts loose	Tighten all mounting bolts
Ruck and pinion mounts 100sc	Tighten an mounting oo

Free play in worm gear	See POWER STEERING GEAR article
Lagga goetar shaft or thrust basing adjustment	See POWER STEERING
Loose sector shaft or thrust bearing adjustment	GEAR
Free play in pot coupling	See STEERING COLUMN
Tree play in pot coupling	article
Worn shaft serrations	See STEERING COLUMN
World Shart Scrittions	article
Growl in Steering Pump	
Excessive pressure in hoses	Restricted hoses, see POWER
Excessive pressure in noses	STEERING GEAR article
Scored pressure plates	See POWER STEERING
2 contract prince	GEAR article
Scored thrust plates or rotor	See POWER STEERING
	GEAR article
Extreme wear of cam ring	See POWER STEERING
	GEAR article
Rattle in Steering Pump	·
Vanes not installed	See POWER STEERING
	PUMP article
Vanes sticking in rotor	See POWER STEERING
	PUMP article
Swish noise in Pump	
Defective flow control valve	See POWER STEERING
	PUMP article
Groan in Steering Pump	
Air in fluid	See POWER STEERING
	PUMP article
Poor pressure hose connection	Tighten and check, replace if
	necessary
Squawk When Turning	_
Damper "O" ring on valve spool cut	See POWER STEERING
	PUMP article
Moan or Whine in Pump	
Pump shaft bearing scored	Replace bearing and fluid
Air in fluid or fluid level low	See POWER STEERING
	PUMP article
Hose or column grounded	Check and replace if
	necessary
Cover "O" ring missing or damaged	See POWER STEERING
	PUMP article
Valve cover baffle missing or damaged	See POWER STEERING
	PUMP article
Interference of components in pump	See POWER STEERING

	PUMP article
Loose or poor bracket alignment	Correct or replace if necessary
Hissing When Parking	
Internal leakage in steering gear	Check valved assembly first
Chirp in Steering Pump	,
Loose or worn power steering belt	Adjust or replace if necessary
Buzzing When Not Steering	, , ,
Noisy pump	See POWER STEERING
The state of the s	PUMP article
Free play in steering shaft bearing	See STEERING COLUMN
	article
Bearing loose on shaft serrations	See STEERING COLUMN
	article
Clicking Noise in Pump	
Pump slippers too long	See POWER STEERING
	PUMP article
Broken slipper springs	See POWER STEERING
	PUMP article
Excessive wear or nicked rotors	See POWER STEERING
	PUMP article
Damaged cam contour	See POWER STEERING
	PUMP article
Poor Return of Wheel	
Wheel rubbing against turn signal	See STEERING COLUMN
	SWITCHES article
Flange rubbing steering gear adjuster	See STEERING COLUMN
	article
Tight or frozen steering shaft bearing	See STEERING COLUMN
	article
Steering gear out of adjustment	See POWER STEERING
	GEAR article
Sticking or plugged spool valve	See POWER STEERING
Y C (1 1)	PUMP article
Improper front end alignment	See WHEEL ALIGNMENT article
Wheel begings were or loose	See FRONT SUSPENSION
Wheel bearings worn or loose	article
Ties rods or ball joints binding	Check and replace if
Ties rous or barr joints britaing	necessary
Intermediate shaft joints binding	See STEERING COLUMN
intermediate shart joints officing	article
Kinked pressure hoses	Correct or replace if necessary
Loose housing head spanner nut	See POWER STEERING
Loose nousing nead spanner nut	GEAR article

Damaged valve lever	See POWER STEERING
	GEAR article
Sector shaft adjusted too tight	See ADJUSTMENTS in
	POWER STEERING GEAR
	article
Worm thrust bearing adjusted too tight	See ADJUSTMENTS in
	POWER STEERING GEAR article
Desetion sine etichine in evilinden	See POWER STEERING
Reaction ring sticking in cylinder	GEAR article
Reaction ring sticking in housing head	See POWER STEERING
Reaction ring sticking in housing head	GEAR article
Steering pump internal leakage	See POWER STEERING
Steering pump internal leakage	PUMP article
Steering gear-to-column misalignment	See STEERING COLUMN
Steering goar to cordina misangimione	article
Lack of lubrication in linkage	Service front suspension
Lack of lubrication in ball joints	Service front suspension
Increased Effort When Turning Wheel Fast Foaming, Milky Power Ste	-
Low Pressure	ering raid, how raid bever or
High internal pump leakage	See POWER STEERING
Tanga mayana pamp ayanaga	PUMP article
Power steering pump belt slipping	Adjust or replace if necessary
Low fluid level	Check and fill to proper level
Engine idle speed to low	Adjust to correct setting
Air in pump fluid system	See POWER STEERING
This in pump state system	PUMP article
Pump output low	See POWER STEERING
PP	PUMP article
Steering gear malfunctioning	See POWER STEERING
	GEAR article
Wheel Surges or Jerks	
Low fluid level	Check and fill to proper level
Loose fan belt	Adjust or replace if necessary
Insufficient pump pressure	See POWER STEERING
	PUMP article
Sticky flow control valve	See POWER STEERING
	PUMP article
Linkage hitting oil pan at full turn	Replace bent components
Kick Back or Free Play	
Air in pump fluid system	See POWER STEERING
	PUMP article
Worn poppet valve in steering gear	See POWER STEERING
	PUMP article

Excessive over center lash	See POWER STEERING
	GEAR article
Thrust bearing out of adjustment	See POWER STEERING
	GEAR article
Free play in pot coupling	See POWER STEERING
	PUMP article
Steering gear coupling loose on shaft	See POWER STEERING
	PUMP article
Steering disc mounting bolts loose	Tighten or replace if
	necessary
Coupling loose on worm shaft	Tighten or replace if
	necessary
Improper sector shaft adjustment	See POWER STEERING
	GEAR article
Excessive worm piston side play	See POWER STEERING
	GEAR article
Damaged valve lever	See POWER STEERING
	GEAR article
Universal joint loose	Tighten or replace if
	necessary
Defective rotary valve	See POWER STEERING
	GEAR article
No Power When Parking	
Sticking flow control valve	See POWER STEERING
	PUMP article
Insufficient pump pressure output	See POWER STEERING
Incommentation prompt processors compare	PUMP article
Excessive internal pump leakage	See POWER STEERING
The state of the s	PUMP article
Excessive internal gear leakage	See POWER STEERING
Zizoszi v miorium geni ioniunge	PUMP article
Flange rubs against gear adjust plug	See STEERING COLUMN
Tamage and against gam unjust pang	article
Loose pump belt	Adjust or replace if necessary
Low fluid level	Check and add proper amount
Downald level	of fluid
Engine idle too low	Adjust to correct setting
Steering gear-to-column misaligned	See STEERING COLUMN
Steering gear to corumn misanghea	article
No Power, Left Turn	urticle
Left turn reaction seal "O" ring worn	See POWER STEERING
Left turn reaction scar & ring worm	GEAR article
Left turn reaction seal damaged/missing	See POWER STEERING
Left turn reaction scar damaged/inissing	GEAR article
	OLAR atticle

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See POWER STEERING PUMP article
'
See STEERING COLUMN
article
See POWER STEERING
GEAR article
See POWER STEERING
GEAR article
See POWER STEERING GEAR article
See POWER STEERING
GEAR article
GL/ IX article
Replace, see POWER
STEERING GEAR article
See WHEEL ALIGNMENT
article
See POWER STEERING
GEAR article
See POWER STEERING
PUMP article
See POWER STEERING
PUMP article
Replace and check
adjustments
See POWER STEERING
PUMP article
See POWER STEERING PUMP article
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PUMP article

STEERING COLUMN TROUBLE SHOOTING

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BASIC STEERING COLUMN TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Noise in Steering	·
Coupling pulled apart	See STEERING COLUMNS
	article
Column not correctly aligned	See STEERING COLUMNS
	article
Broken lower joint	Replace joint
Horn contact ring not	See STEERING COLUMN
Dogring not lubricated	article See STEERING COLUMN
Bearing not lubricated	article
Shaft snap ring not properly seated	Reseat or replace snap ring
Plastic spherical joint not lubricated	See STEERING COLUMN
Trastic sprictical joint not tuetteated	article
Shroud or housing loose	Tighten holding screws
Lock plate retaining ring not seated	See STEERING COLUMN
	article
Loose sight shield	Tighten holding screws
High Steering Shaft Effort	
Column assembly misaligned	See STEERING COLUMN
	article
Improperly installed dust shield	Adjust or replace
Tight steering universal joint	See STEERING COLUMN
II. 1 di o Ecc	article
High Shift Effort	G GEFFRAG GOLLAROL
Column is out of alignment	See STEERING COLUMN article
Improperly installed dust shield	Adjust or replace
Seals or bearings not lubricated	See STEERING COLUMNS
Seals of bearings not indiffered	article
Mounting bracket screws too long	Replace with new shorter
Tribuning of action to long	screws
Burrs on shift tube	Remove burrs or replace tube
Lower bowl bearing assembled wrong	See STEERING COLUMN
	article
Shift tube bent or broken	Replace as necessary
Improper adjustment of shift levers	See STEERING COLUMN
	article
Improper Trans. Shifting	
Sheared shift tube joint	Replace as necessary
Sheared lower shaft lever	Replace as necessary
Improper shift lever adjustment	See STEERING COLUMN

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	article
Improper gate plate adjustment	See STEERING COLUMN
	article
Excess Play in Column	
Instrument panel bracket bolts loose	Tighten bolts and check
	bracket
Broken weld nut on jacket	See STEERING COLUMN
	article
Instrument bracket capsule sheared	See STEERING COLUMN
	article
Column bracket/jacket bolts loose	Tighten bolts and check
	bracket
Steering Locks in Gear	
Release lever mechanism	See STEERING COLUMN
	article

SUSPENSION TROUBLE SHOOTING

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BASIC SUSPENSION TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Front End Noise	·
Loose or worn wheel	See Wheel Bearing
	Adjustment in SUSPENSION
Worn shocks or shock mountings	Replace struts or strut
	mountings
Worn struts or strut mountings	Replace struts or strut
	mountings
Loose or worn lower control arm	See SUSPENSION
Loose steering gear-to-frame bolts	See STEERING
Worn control arm bushings	See SUSPENSION
Ball joints not lubricated	Lubricate ball joints & see
	Ball Joint Checking in
	SUSPENSION
Front Wheel Shake, Shimmy, or Vibration	
Tires or wheels out of balance	Check tire balance
Incorrect wheel alignment	See WHEEL ALIGNMENT
Drive shaft unbalanced	Check drive shaft balance
Loose or worn wheel bearings	See WHEEL ALIGNMENT

Loose or worn tie rod ends	See SUSPENSION
Worn upper ball joints	See Ball Joint Checking in
	SUSPENSION
Worn shock absorbers	Replace shock absorbers
Worn strut bushings	Replace strut bushings
Car Pulls to One Side	
Mismatched or uneven tires	Check tire condition
Broken or sagging springs	See SUSPENSION
Loose or worn strut bushings	See SUSPENSION
Improper wheel alignment	See WHEEL ALIGNMENT
Improper rear axle alignment	Check rear axle alignment
Power steering gear unbalanced	See STEERING
Front brakes dragging	See BRAKES
Abnormal Tire Wear	,
Unbalanced tires	Check tire balance & rotation
Sagging or broken springs	See SUSPENSION
Incorrect front end alignment	See WHEEL ALIGNMENT
Faulty shock absorbers	Replace chock absorbers
Scuffed Tires	1
Toe-In incorrect	See WHEEL ALIGNMENT
Suspension arm bent or twisted	See appropriate
1	SUSPENSION article
Springs Bottom or Sag	
Bent or broken springs	See SUSPENSION
Leaking or worn shock absorbers	Replace shock absorbers
Frame misalignment	Check frame for damage
Spring Noises	
Loose "U" Bolts	See SUSPENSION
Loose or worn bushings	See SUSPENSION
Worn or missing interliners	See SUSPENSION
Shock Absorber Noise	
Loose shock mountings	Check & tighten mountings
Worn bushings	Replace bushings
Air in system	Bleed air from system
Undercoating on shocks	Remove undercoating
Car Leans or Sways on Corners	
Loose stabilizer bar	See SUSPENSION
Faulty shocks or mountings	Replace shocks or mountings
Broken or sagging springs	See SUSPENSION
Shock Absorbers Leaking	200 2021 21 (8101)
Worn seals or reservoir tube crimped	See SUSPENSION

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Broken Springs	
Loose "U" bolts	See SUSPENSION
Inoperative shock absorbers	Replace shock absorbers

WHEEL ALIGNMENT TROUBLE SHOOTING

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BASIC WHEEL ALIGNMENT TROUBLE SHOOTING CHART

CONDITION & POSSIBLE CAUSE	CORRECTION
Premature Tire Wear	
Improper tire inflation	Check tire pressure
Front alignment out of tolerance	See ALIGNMENT SPECS in
	WHEEL ALIGNMENT
	section
Suspension components worn	See SUSPENSION section
Steering system components worn	See STEERING section
Improper standing height	See WHEEL ALIGNMENT
Uneven or sagging springs	See SUSPENSION section
Bent wheel	See WHEEL ALIGNMENT
Improper torsion bar adjustment	See SUSPENSION section
Loose or worn wheel bearings	See WHEEL BEARING ADJ.
	in SUSPENSION section
Worn or defective shock	Replace shock absorbers
Tires out of balance	Check tire balance
Pulls to One Side	
Improper tire inflation	Check tire pressure
Brake dragging	See BRAKE section
Mismatched tires	See WHEEL ALIGNMENT
Broken or sagging spring	See SUSPENSION section
Broken torsion bar	See SUSPENSION section
Power steering valve not centered	See STEERING section
Front alignment out of tolerance	See WHEEL ALIGNMENT
	section
Defective wheel bearing	See WHEEL BEARINGS in
	SUSPENSION section
Uneven sway bar links	See SUSPENSION section
Frame bent	Check for frame damage
Steering system bushing worn	See STEERING section

Ball joint tight or seized See SUSPENSION section Steering linkage too tight See SUSPENSION section Power steering fluid low Add proper amount of fluid Power steering drive belt loose See STEERING section Power steering pump defective See STEERING section Steering gear out of adjustment See WHELL ALIGNMENT Damaged steering gear Damaged steering gear See STEERING section Bent steering knuckle or supports See SUSPENSION section Bent steering knuckle or supports Vehicle "Wanders" Strut rod or control arm bushing worn Loose or worn wheel bearings See WHELL BEARINGS in SUSPENSION section Improper tire inflation Check tire pressure Stabilizer bar missing or defective See SUSPENSION section Wheel alignment out of tolerance See SUSPENSION section Broken spring See SUSPENSION section Broken spring See SUSPENSION section Defective shock absorber Worn steering & suspension components Front End Shimmy Tire out of balance/round Excessive wheel runout See WHEEL ALIGNMENT Insufficient or improper caster Whorn suspension or steering components See SUSPENSION section Defective shock absorbers Replace shock absorbers Replace shock absorbers Replace shock absorbers Replace shock absorbers See SUSPENSION section Section See WHEEL ALIGNMENT Section See WHEEL ALIGNMENT Insufficient or improper caster See WHEEL ALIGNMENT Section See SUSPENSION section Front End Shimmy Tire out of balance/round See WHEEL ALIGNMENT Section See SUSPENSION section Front End Shimmy See SUSPENSION section See SUSPENSION section Secting sear box (rack) mounting loose See SUSPENSION section Secting gear adjustment loose See SUSPENSION section Secting gear adjustment loose See SUSPENSION section	Hard Steering	
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Power steering fluid low Add proper amount of fluid Power steering drive belt loose See STEERING section Power steering pump defective See STEERING section Steering gear out of adjustment See STEERING section Incorrect wheel alignment See WHEEL ALIGNMENT Damaged steering gear See STEERING section Damaged suspension See SUSPENSION section Bent steering knuckle or supports See SUSPENSION section Bent steering knuckle or supports See SUSPENSION section Loose or worm wheel bearings See WHEEL BEARINGS in SUSPENSION section Improper tire inflation See SUSPENSION section Improper tire inflation See SUSPENSION section Wheel alignment out of tolerance Stabilizer bar missing or defective See SUSPENSION section Wheel alignment out of tolerance See Adjustment in WHEEL ALIGNMENT section Defective shock absorber Replace shock absorbers Worn steering & suspension components See SUSPENSION section Front End Shimmy Tire out of balance/round See SUSPENSION section Check tire balance Excessive wheel runout See WHEEL ALIGNMENT Section Worn suspension or steering components See SUSPENSION section Defective shock absorbers See WHEEL ALIGNMENT Section Section Defective shock absorbers See SUSPENSION section Section Section See Suspension or steering components See SUSPENSION section Defective shock absorbers See SUSPENSION section Section See Suspension or steering components See SUSPENSION section Section Prover steering reaction Bracket loose See STEERING section Steering gear box (rack) mounting loose See STEERING section Steering gear adjustment loose See STEERING section Steering gear adjustment loose See SUSPENSION section Section Frame bent See SUSPENSION section Check frame for damage	Ball joint tight or seized	See SUSPENSION section
Power steering fluid low Power steering drive belt loose Power steering pump defective See STEERING section Power steering pump defective Steering gear out of adjustment See STEERING section Incorrect wheel alignment See WHEEL ALIGNMENT Damaged steering gear See SUSPENSION section Bent steering knuckle or supports See SUSPENSION section Bent steering knuckle or supports Strut rod or control arm bushing worn Loose or worn wheel bearings Strut rod or control arm bushing worn See SUSPENSION section Improper tire inflation Check tire pressure Stabilizer bar missing or defective See SUSPENSION section Wheel alignment out of tolerance See Adjustment in WHEEL ALIGNMENT section Defective shock absorber Replace shock absorbers Worn steering & suspension components Front End Shimmy Tire out of balance/round Excessive wheel runout Insufficient or improper caster Worn suspension or steering components See SUSPENSION section Power steering reaction Bracket loose See SUSPENSION section See WHEEL BEARING ADJ. in SUSPENSION section Power steering reaction Bracket loose See SUSPENSION section See STEERING section See STEERING section See STEERING section See STEERING section See SUSPENSION sec	Steering linkage too tight	See STEERING LINKAGE in
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Lower control arm bent See SUSPENSION section Frame bent Check frame for damage	1 0	1
Frame bent Check frame for damage	-	See SUSPENSION section
Camper Not Aquistable	Camber Not Adjustable	

	2008 MINI Cooper	
GENE	AL INFORMATION Trouble Shooting - Basic Procedures	

Control arm bent	See SUSPENSION section
Frame bent	Check frame for damage
Hub & bearing not seated properly	See SUSPENSION section

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00 GENERAL

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

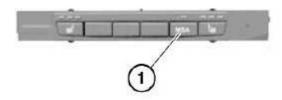
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 1: Identifying Button In Passenger Compartment Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

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When working with diagnosis tools:

Observe instructions in diagnosis tool

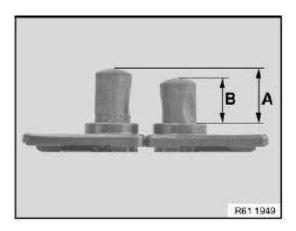


Fig. 2: Identifying Engine Hood/Bonnet Mount Height Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For further information on automatic engine start-stop system (MSA):

• Refer to <u>ENGINE ELECTRICAL SYSTEM - REPAIR INSTRUCTIONS -- 2007</u> HATCHBACK.

51 00 ... NOTES ON BONDING/ATTACHING COMPONENTS WITH DOUBLE-SIDED ADHESIVE TAPE

1. General notes

- o Bonding at room and object temperature of 18 to 25°C.
- o Newly painted parts may only be bonded after a drying time of at least 24 hours.
- o Optimal bonding/attachment to the background surface is achieved after approx. 48 hours. Components must not be exposed to mechanical strain beforehand (car wash, strength test, etc.).
- o Do not touch bonding area.
- o It is not the length of time that pressure is applied but rather the level of pressure applied that is crucial.
- o Detaching the adhesive tape after pressing destroys the adhesive layer.
- o After being pressed on gently, adhesive tape can be pulled off again up to 3 times.

2. Auxiliary materials and tools

- Spirit, fluff-free cleaning cloths
- o Pressure roller

3. Preparations

- o Remove all remnants of adhesive or clean new part thoroughly
- o Clean the areas to be bonded with spirit immediately before bonding to remove silicone and grease

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residues.

NOTE: Observe ventilation time > or =1 minute.

4. Bonding

- 1. Components without pre-fitted adhesive tape
 - o Pull off liner* from adhesive tape.
 - o Position adhesive tape on component and stick on.
 - o Press down adhesive tape over entire bonding area.
 - o Continue with Point 4.2
 - * Liner is the protective film on the adhesive tape
- 2. Components with pre-fitted adhesive tape
 - o Pull off liner on adhesive side.
 - o Align component in correct position on vehicle.
 - o Press down component over entire bonding area.

51 00 ... SAFETY INSTRUCTIONS FOR WORKING ON CARS WITH AIRBAG SYSTEMS

WARNING: If work is carried out in area of airbag systems, e.g. on:

- o Door trim panels
- Interior trims
- Instrument panel etc.

the ignition must be turned off in each case.

- o The ignition must always be off.
- o The ignition key must be removed from the ignition lock.

This eliminates the risk of injury.

51 11 .. OVERVIEW OF FRONT BUMPER

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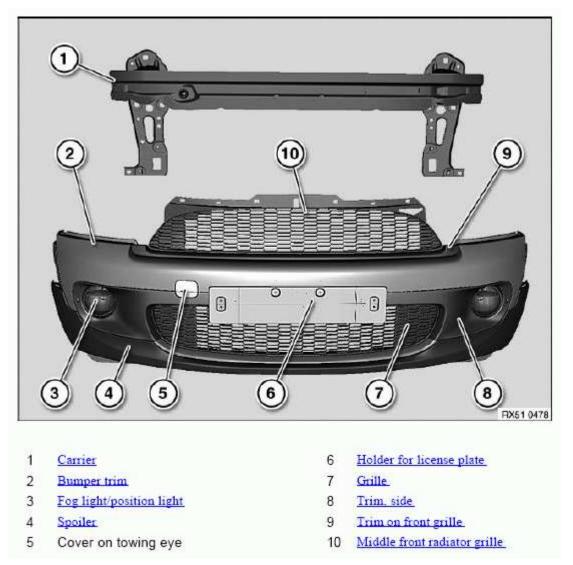


Fig. 3: Identifying Front Bumper Components Courtesy of BMW OF NORTH AMERICA, INC.

51 12 .. OVERVIEW OF REAR BUMPER

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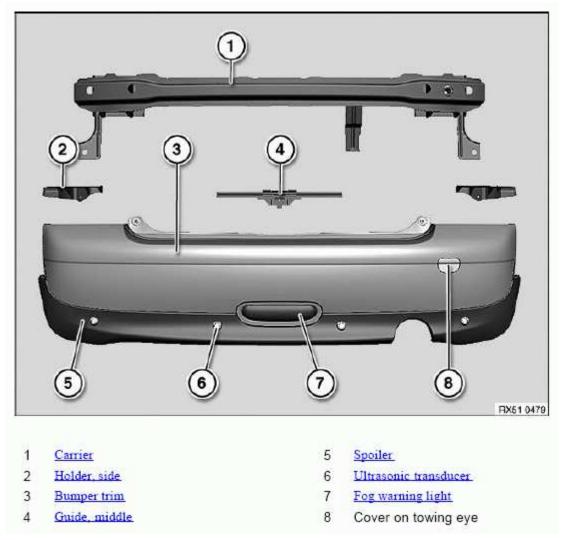
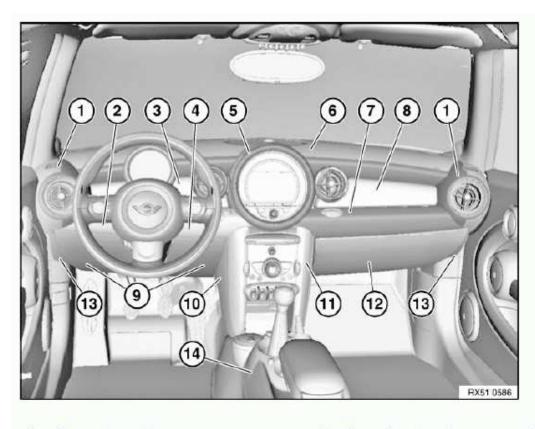


Fig. 4: Identifying Rear Bumper Components
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 .. OVERVIEW OF INSTRUMENT PANEL

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- 1 Cover, air vent, side
- 2 Knee protection, driver's side, left
- 3 Decorative strip on instrument panel, left
- 4 Knee protection, driver's side, right
- 5 Cover, instruments
- 6 Trim, instrument panel upper section
- 7 Knee protection, passenger side Carrier for instrument panel

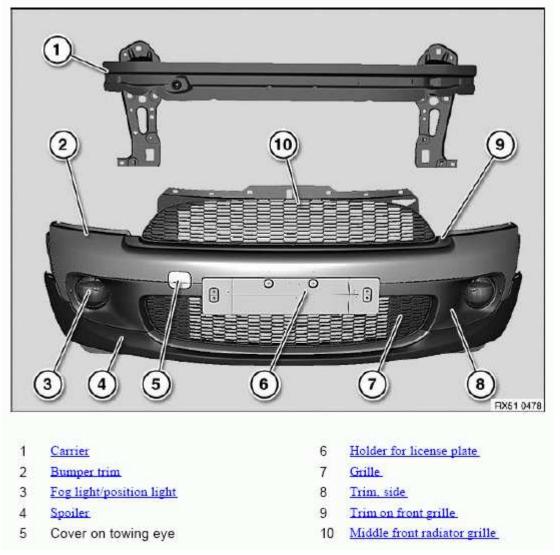
- 8 Decorative strip on instrument panel, right
- 9 Instrument panel trim, bottom left
- 10 Trim, centre console, side
- 11 Trim, centre console
- 12 Glovebox lid
- 13 Instrument panel lower section
- 14 Centre console
 - Function carrier on centre console

Fig. 5: Identifying Instrument Panel Components Courtesy of BMW OF NORTH AMERICA, INC.

11 FRONT BUMPER

51 11 .. OVERVIEW OF FRONT BUMPER

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<u>Fig. 6: Identifying Front Bumper Components</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 11 050 REMOVING AND INSTALLING/REPLACING CARRIER FOR FRONT BUMPER TRIM

Special tools required:

• 00 2 271

Necessary preliminary tasks:

• Remove front bumper trim. Refer to <u>51 11 156 REMOVING AND INSTALLING FRONT BUMPER TRIM</u>.

NOTE: The operation is described on the right side; proceed in the same way for the left side.

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The position of the front panel is not altered by special tool 00 2 271. Therefore no adjustment work is required.

Insert special tool 00 2 271 and screw down.

If necessary, release cable holder (1).

Unfasten screws (2 and 4).

Release nuts (3) and remove carrier.

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

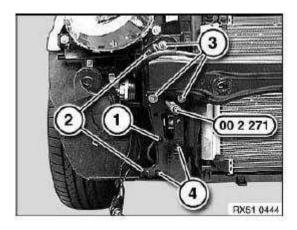


Fig. 7: Identifying Cable Holder, Screws And Nuts Courtesy of BMW OF NORTH AMERICA, INC.

51 11 152 REMOVING AND INSTALLING/REPLACING CENTRE SPOILER ON BUMPER TRIM

Necessary preliminary tasks:

• Remove front bumper trim. Refer to <u>51 11 156 REMOVING AND INSTALLING FRONT BUMPER TRIM</u>.

Release catches (1) and remove spoiler (2).

Installation:

Catches (1) must not be damaged.

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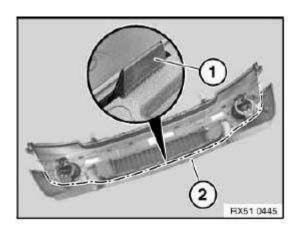


Fig. 8: Identifying Catches And Spoiler Courtesy of BMW OF NORTH AMERICA, INC.

51 11 156 REMOVING AND INSTALLING FRONT BUMPER TRIM

Necessary preliminary tasks:

- Remove front grille
- Remove trim on wheel arch from bumper trim

Release screws (1).

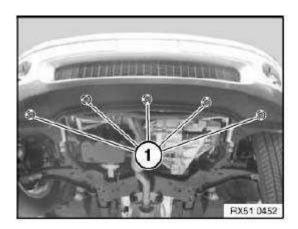


Fig. 9: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).

Pull bumper trim (3) slightly towards front with aid of a 2nd person.

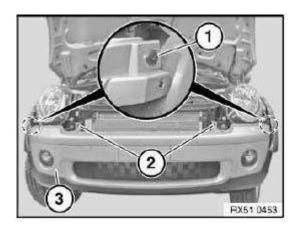
Disconnect plug connections, depending on version.

Remove bumper trim (3) towards front with aid of a 2nd person.

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Installation:

Check body gap dimensions and adjustment as necessary.



<u>Fig. 10: Identifying Bumper Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 11 157 REPLACING FRONT BUMPER TRIM

Necessary preliminary tasks:

- Remove front bumper trim
- Remove position light/fog light on left/right
- Remove grille
- Remove trim for bumper trim on left/right
- Remove spoiler

51 11 158 REPLACING BASEPLATE FOR NUMBER/LICENSE PLATE

Necessary preliminary tasks:

• Remove front number/license plate

Release screws (1) and remove pad (2).

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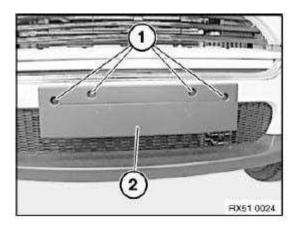


Fig. 11: Identifying Pad Courtesy of BMW OF NORTH AMERICA, INC.

51 11 164 REMOVING AND INSTALLING/REPLACING TRIM FOR BUMPER TRIM ON LEFT OR RIGHT

Special tools required:

• 00 9 322

Necessary preliminary tasks:

• Remove holder for license plate.

Unclip trim (1) with special tool 00 9 322.

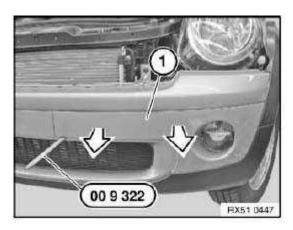


Fig. 12: Uncliping Trim With Special Tool 00 9 322 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) and guides (2) on trim (3) must not be damaged.

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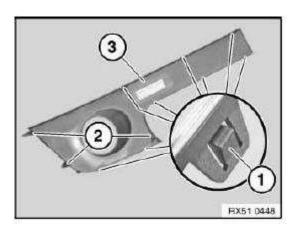


Fig. 13: Identifying Catches And Guides On Trim Courtesy of BMW OF NORTH AMERICA, INC.

51 11 180 REMOVING AND INSTALLING / REPLACING TRIM GRILLE IN BUMPER TRIM

Necessary preliminary tasks:

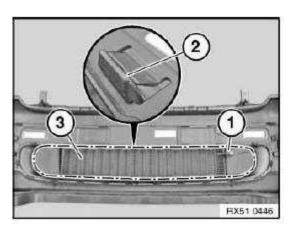
• Remove front bumper trim

Remove outside temperature sensor (1).

Release catches (2) and remove grille (3).

Installation:

Catches on grille and bumper trim must not be damaged.



<u>Fig. 14: Identifying Outside Temperature Sensor, Catches And Grille</u> Courtesy of BMW OF NORTH AMERICA, INC.

12 REAR BUMPER

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51 12 .. OVERVIEW OF REAR BUMPER

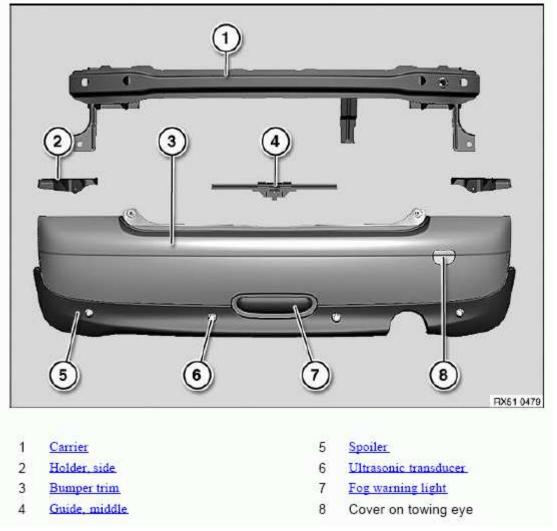


Fig. 15: Identifying Rear Bumper Components Courtesy of BMW OF NORTH AMERICA, INC.

51 12 050 REMOVING AND INSTALLING/REPLACING CARRIER FOR REAR BUMPER TRIM

Necessary preliminary tasks:

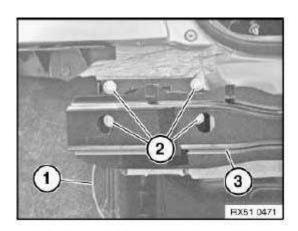
• Remove bumper trim

If necessary, detach cable (1) for ultrasonic transducer from carrier (3).

Release screws (2) on left/right and remove carrier (3).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

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<u>Fig. 16: Identifying Cable And Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 12 070 REPLACING CENTRE SPOILER ON REAR BUMPER TRIM

Necessary preliminary tasks:

• Remove bumper trim.

Release catches (1) and remove spoiler (2).

Installation:

Catches (1) on spoiler and bumper trim must not be damaged.

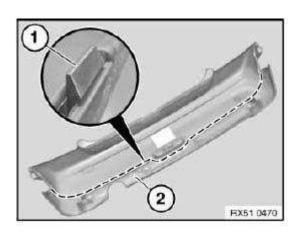


Fig. 17: Identifying Catches And Spoiler Courtesy of BMW OF NORTH AMERICA, INC.

51 12 156 REMOVING AND INSTALLING REAR BUMPER TRIM

Necessary preliminary tasks:

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• Remove trim on wheel arch from bumper trim

Release clip (1) on left and right.

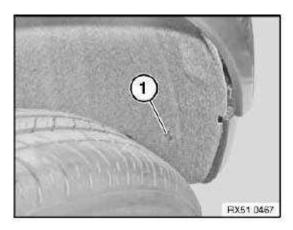
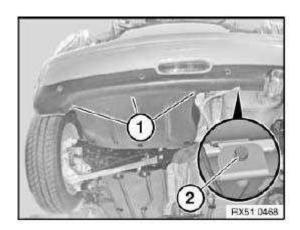


Fig. 18: Identifying Clip Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).



<u>Fig. 19: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

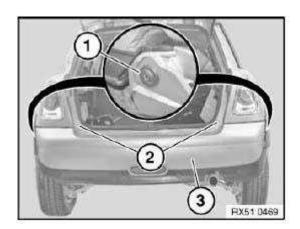
Undo screws (1 and 2)

Pull off bumper trim (3) slightly towards rear with aid of a 2nd person.

Disconnect plug connections for rear fog light/ultrasonic transducer.

Remove bumper trim (3).

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<u>Fig. 20: Identifying Bumper Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 12 157 REPLACING REAR BUMPER TRIM

Necessary preliminary tasks:

- Remove bumper trim
- Remove rear fog light
- Remove center spoiler
- Remove all ultrasonic transducers

COOPER S:

• Remove grille

51 12 801 REPLACING BRACKET FOR REAR BUMPER AT LEFT OR RIGHT

Necessary preliminary tasks:

• Remove rear bumper trim

Release clip (1).

Release screw (2) and remove bracket (4).

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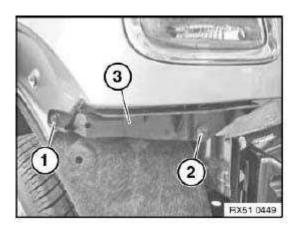


Fig. 21: Identifying Bracket And Clip Courtesy of BMW OF NORTH AMERICA, INC.

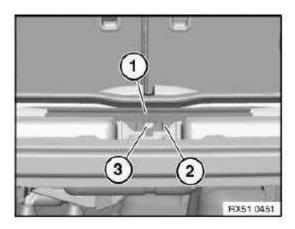
51 12 825 REMOVING AND INSTALLING/REPLACING GUIDE FOR REAR CENTRE BUMPER

Necessary preliminary tasks:

• Remove rear bumper trim

Feed out guide (1) from holder (2).

Release screw (3) and remove bracket (2).



<u>Fig. 22: Identifying Guide, Holder And Bracket</u> Courtesy of BMW OF NORTH AMERICA, INC.

13 TRIM, COVERS, HANDLE

51 13 000 REMOVING AND INSTALLING/REPLACING FRONT GRILL CENTRE SECTION

Necessary preliminary tasks:

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• Remove trim from front grille

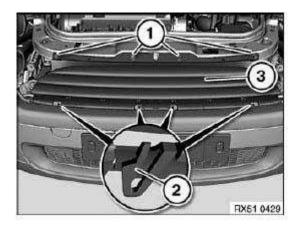
Release expansion rivets (1).

Press together catches (2) and remove front grille (3) towards front.

Installation:

Catches (2) must not be damaged.

If necessary, replace faulty expander rivets (1).



<u>Fig. 23: Identifying Catches, Expander Rivets And Front Grille</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 13 003 REMOVING AND INSTALLING/REPLACING TRIM ON FRONT GRILLE

Press down catches (1) from inside behind trim (2) and unclip trim (2) towards front.

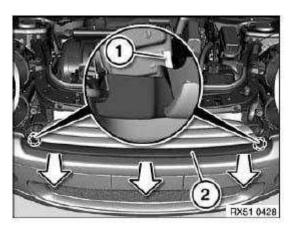


Fig. 24: Uncliping Trim
Courtesy of BMW OF NORTH AMERICA, INC.

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51 13 009 REMOVING AND INSTALLING/REPLACING TRIM STRIP ON ENGINE HOOD/BONNET

Release screws (1) on rear side of front grille frame (2).

Release front grille frame (2) at clips (3) from engine hood/bonnet.

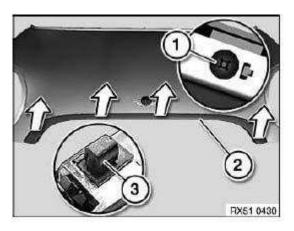
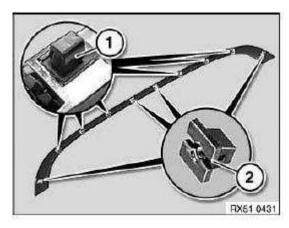


Fig. 25: Releasing Front Grille Frame From Engine Hood/Bonnet Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace faulty clips (1) and insert nuts (2).



<u>Fig. 26: Identifying Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 13 015 REMOVING AND INSTALLING/REPLACING TRIM RING FOR LEFT OR RIGHT HEADLIGHT

Destroy clips (1), guides (2) must not be damaged in the process.

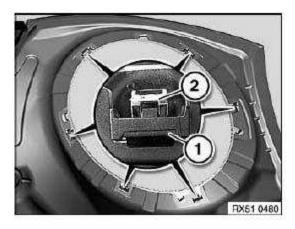
Remove trim ring.

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Installation:

Guides (2) must not be damaged.

Mount trim ring with pre-installed clips (1) on engine hood/bonnet.



<u>Fig. 27: Identifying Guides And Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 13 102 REMOVING AND INSTALLING/REPLACING TRIM ON FRONT LEFT OR RIGHT WHEEL ARCH

If necessary, release clip on wheel arch trim (1).

Bend wheel arch trim (1) inwards slightly and release clip (2).

Installation:

If necessary, replace faulty clip (2).

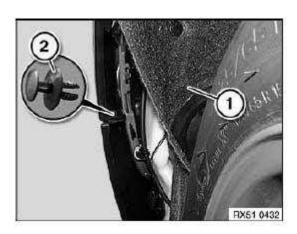


Fig. 28: Identifying Trim And Clip Courtesy of BMW OF NORTH AMERICA, INC.

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Feed trim (1) in area (A) towards front out of bumper.

Release trim (1) at clips (2) and remove.

Installation:

If necessary, replace faulty clips (2).

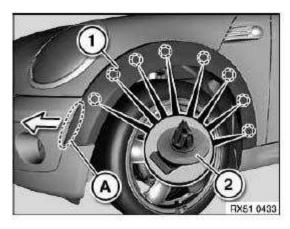


Fig. 29: Removing Trim
Courtesy of BMW OF NORTH AMERICA, INC.

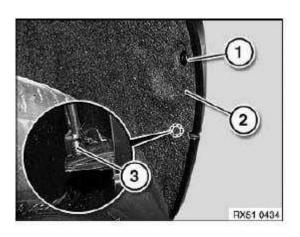
51 13 105 REMOVING AND INSTALLING/REPLACING TRIM ON REAR LEFT OR RIGHT WHEEL ARCH

Release clip (1).

Fold wheel arch trim (2) inwards slightly and release clip (3).

Installation:

If necessary, replace faulty clips (1 and 3).



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Fig. 30: Identifying Wheel Arch Trim And Clip Courtesy of BMW OF NORTH AMERICA, INC.

Feed trim (1) in area (A) towards rear out of bumper.

Release trim (1) at clips (2) and remove.

Installation:

If necessary, replace faulty clips (2).

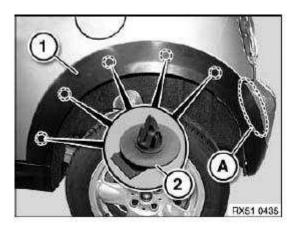


Fig. 31: Identifying Trim And Clips Courtesy of BMW OF NORTH AMERICA, INC.

51 13 123 REMOVING AND INSTALLING/REPLACING LEFT COWL PANEL COVER

Necessary preliminary tasks:

- Remove right cowl panel cover
- Remove both windscreen wiper arms

Remove gasket (1).

Release nut (2) and screw (3).

Unclip cover (5) towards top from retaining strip (4) and feed out.

Installation:

Make sure cover (5) is correctly seated on retaining strip (4).

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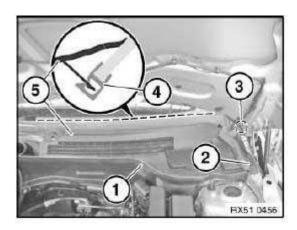


Fig. 32: Identifying Gasket, Cover And Retaining Strip Courtesy of BMW OF NORTH AMERICA, INC.

51 13 124 REMOVING AND INSTALLING/REPLACING RIGHT COWL PANEL COVER

Remove gasket (1).

Release nut (2) and screw (3).

Unclip cover (4) towards top from retaining strip (5) and feed out.

Installation:

Make sure cover (4) is correctly seated on retaining strip (5).

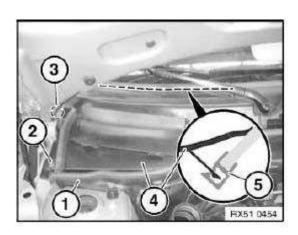


Fig. 33: Identifying Cover, Gasket And Retaining Strip Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Seals (1) on cover (2) must not be damaged.

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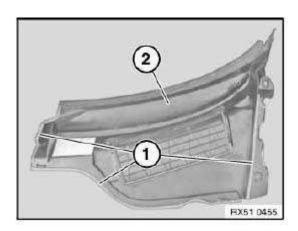


Fig. 34: Identifying Seals On Cover Courtesy of BMW OF NORTH AMERICA, INC.

51 13 301 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ROOF TRIM STRIP

Release door seal in area of roof trim strip.

Release screws (1).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Unclip trim strip in direction of arrow from rear to front.

Slide trim strip towards front and release from front clip.

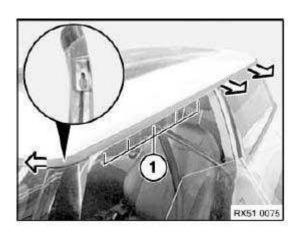


Fig. 35: Uncliping Trim Strip Courtesy of BMW OF NORTH AMERICA, INC.

51 13 375 REMOVING AND INSTALLING/REPLACING TRIM ON LEFT OR RIGHT REAR ROOF PILLAR (C-PILLAR)

Special tools required:

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• 00 9 317

Necessary preliminary tasks:

• Remove strip on side window

Pull roof trim strip (1) out of both last clips.

IMPORTANT: Risk of damage!

Ensure temperature balance; trims which are too cold can be damaged when removed.

Position special tool 00 9 317 as closely as possible to clips (2) and lever out trim (3) with a short sharp jerk.

Installation:

If necessary, replace faulty clips (2).

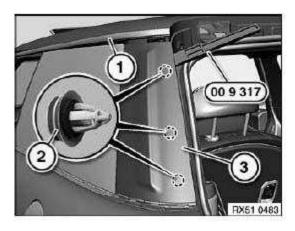


Fig. 36: Identifying Roof Trim Strip, Clips And Trim Courtesy of BMW OF NORTH AMERICA, INC.

51 13 402 REMOVING AND INSTALLING/REPLACING STRIP HANDLE (REAR LID)

Release screws (1) on strip handle (2).

Pull strip handle (2) off rear lid, disconnect plug connection and remove strip handle (2).

Replacement:

Modify bulbs for number/license plate light.

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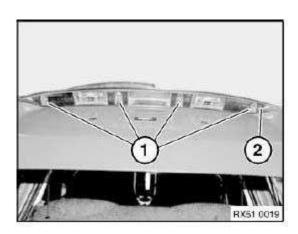


Fig. 37: Identifying Screws On Strip Handle Courtesy of BMW OF NORTH AMERICA, INC.

51 13 425 REMOVING AND INSTALLING/REPLACING TRIM ON LEFT OR RIGHT REAR LIGHT

Special tools required:

• 00 9 323

Unclip trim (1) with special tool 00 9 323 at points (2).

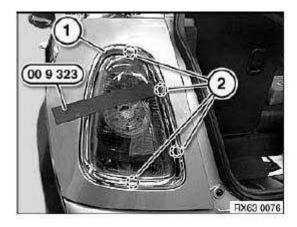


Fig. 38: Identifying Trim And Special Tool 00 9 323 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining tabs (1) and retaining catches (2) must not be damaged.

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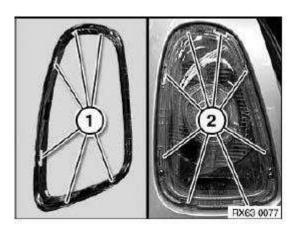


Fig. 39: Identifying Retaining Tabs And Retaining Catches Courtesy of BMW OF NORTH AMERICA, INC.

14 BMW EMBLEMS, MODEL EMBLEMS

51 14 ... INSTRUCTIONS FOR ATTACHING NUMBER/LETTER DESIGNATION COMBINATION

NOTE: The model designation is attached with adhesive and cannot be re-used.

The model designation must be attached at room temperature.

The model designation must be removed at stove - enameling temperatures

exceeding 80°C.

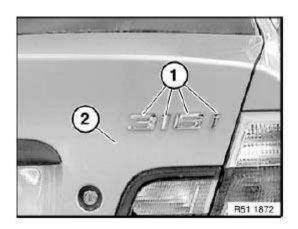
NOTE: The following work steps are described using the "316 i" as the example.

Removing:

Coat nylon string or strong yarn with TensidesTM (e.g. washing-up liquid).

Cut through adhesive layer and remove model designation (1) from rear lid (2).

Remove remainder of adhesive layer with adhesive remover (sourcing reference: BMW Parts Service).



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Fig. 40: Identifying Model Designation And Rear Lid Courtesy of BMW OF NORTH AMERICA, INC.

Assembly:

Number and letter combinations (1) of the model designation are not connected to each other and are supplied on a carrier film (2).

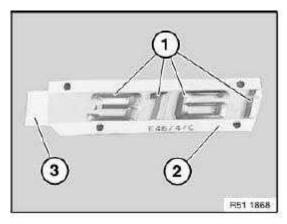
IMPORTANT: Adhesive areas must be dry and free of dust and grease.

Once it has been cleaned, do not touch the adhesive area with bare hands.

Remove liner (3) (protective strip for adhesive surface).

Press on model designation firmly.

Remove carrier film (2).



<u>Fig. 41: Identifying Liner, Carrier Film</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 14 002 REMOVING AND INSTALLING/REPLACING FRONT MINI BADGE

Special tools required:

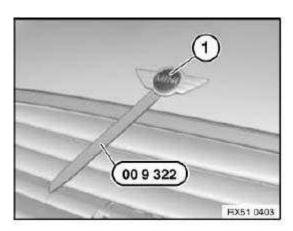
• 00 9 322

IMPORTANT: The Instructions on component cementing with double - sided adhesive tape serve as the basis for this repair instruction and must be observed without fail.

Removing badge:

Heat MINI badge (1) with hot air blower and carefully lever out with special tool 00 9 322.

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<u>Fig. 42: Identifying MINI Badge And Special Tool 00 9 322</u> Courtesy of BMW OF NORTH AMERICA, INC.

Fitting badge:

Pull liner* off adhesive tape (1), position badge over guide pins (2) on hood/bonnet and press down firmly.

* Liner is the protective film on a new badge.

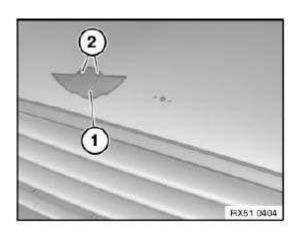


Fig. 43: Identifying Adhesive Tape And Guide Pins Courtesy of BMW OF NORTH AMERICA, INC.

51 14 012 REMOVING AND INSTALLING/REPLACING REAR MINI BADGE

Special tools required:

• 00 9 322

IMPORTANT: The Instructions on component cementing with double - sided adhesive tape serve as the basis for this repair instruction and must be observed without fail.

Removing badge:

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Heat MINI badge (1) with hot air blower and carefully lever out with special tool 00 9 322.

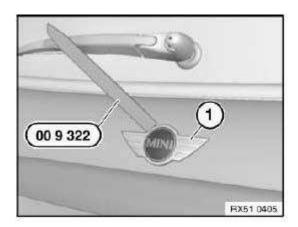


Fig. 44: Identifying MINI Badge And Special Tool 00 9 322 Courtesy of BMW OF NORTH AMERICA, INC.

Fitting badge:

Pull liner* off adhesive tape (1), position badge over guide pins (2) on rear lid and press down firmly.

* Liner is the protective film on a new badge.

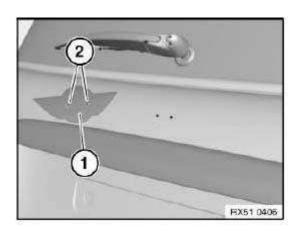


Fig. 45: Identifying Adhesive Tape And Guide Pins Courtesy of BMW OF NORTH AMERICA, INC.

51 14 110 REMOVING AND INSTALLING/REPLACING REAR MODEL DESIGNATION

IMPORTANT: The instructions for number/letter combination cementing serve as the basis for these repair instructions and must be followed without fail.

Mark position of model designation with adhesive tape using dimensions (A and B).

MINI ONE

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A = 194 mm

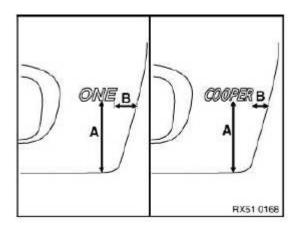
B=63 mm

MINI COOPER and COOPER S

A = 194 mm

B=48 mm

Position model designation and stick down.



<u>Fig. 46: Identifying Model Designation Position Dimensions</u> Courtesy of BMW OF NORTH AMERICA, INC.

16 MIRRORS-COVERS-ASHTRAY

$51\ 16\dots$ REMOVING AND INSTALLING/REPLACING BRACKET FOR INTERIOR REARVIEW MIRROR

Necessary preliminary tasks:

- Remove interior rearview mirror
- Remove roof operating unit

Release clip (1).

Unfasten screws (2 and 3).

If necessary, release cable holder and feed out bracket (4).

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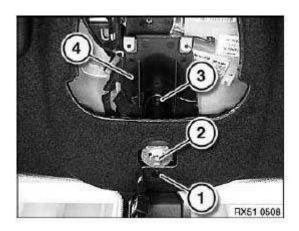


Fig. 47: Identifying Clip And Bracket Courtesy of BMW OF NORTH AMERICA, INC.

$51\ 16\ 000\ REMOVING\ AND\ INSTALLING/REPLACING\ MIRROR\ ON\ LEFT\ OR\ RIGHT\ FRONT\ DOOR$

Fold up mirror (1) as illustrated.

Release screw (2).

Tightening torque. Refer to BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK.

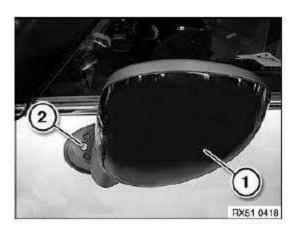


Fig. 48: Identifying Mirror Courtesy of BMW OF NORTH AMERICA, INC.

Turn mirror (1) as illustrated.

Release screw (2).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

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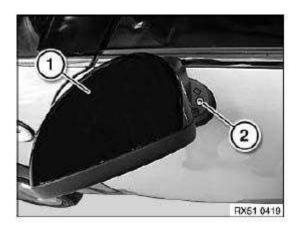


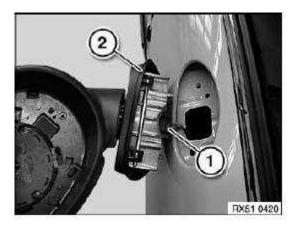
Fig. 49: Identifying Mirror Courtesy of BMW OF NORTH AMERICA, INC.

Pull out mirror.

Disconnect plug connection (1) and remove mirror.

Installation:

Seal (2) must not be damaged.



<u>Fig. 50: Identifying Plug Connection And Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Modify drive for door mirror
- Modify housing on door mirror

51 16 026 REPLACING MIRROR GLASS

Special tools required:

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• 00 9 317

WARNING: Move mirror glass with hand carefully and slowly.

If mirror glass is damaged:

Wear protective goggles and cut-proof gloves.

Risk of injury by flaking-off glass splinters.

IMPORTANT: Bring door mirror to room temperature to prevent catches from breaking off.

NOTE: Secure mirror glass (1) against falling out. Cables for mirror heating are very short.

Press mirror glass (1) on side of car by hand to full extent.

Tape off mirror glass (1) with adhesive tape (2).

Unclip mirror glass (1) all round with special tool 00 9 317.

Disconnect associated plug connections and remove mirror glass (1).



Fig. 51: Removing Mirror Glass Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining lugs (1) must not be damaged.

Fit mirror glass (2) with retaining lugs (1) flush on mirror adjusting drive and clip into place.

Ensure correct locking.

Check function.

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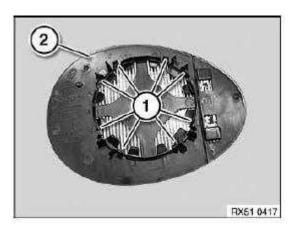


Fig. 52: Identifying Mirror Glass And Retaining Lugs Courtesy of BMW OF NORTH AMERICA, INC.

51 16 040 REMOVING AND INSTALLING/REPLACING HOUSING ON LEFT OR RIGHT DOOR MIRROR

Necessary preliminary tasks:

• Remove mirror glass

Release catches (1) starting at bottom and remove cover.



Fig. 53: Identifying Catches Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) on housing (2) must not be damaged.

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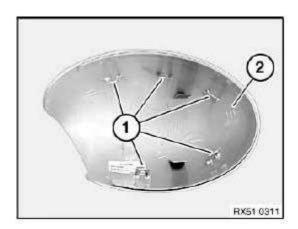


Fig. 54: Identifying Catches On Housing Courtesy of BMW OF NORTH AMERICA, INC.

51 16 060 REMOVING AND INSTALLING OR REPLACING INTERIOR REARVIEW MIRROR

Version with remote control for central locking:

If necessary, disconnect negative lead from battery.

IMPORTANT: To avoid breaking windscreen: Snap out (press) rearview mirror only in direction of travel towards windscreen.

Do not under any circumstances twist the mirror foot when removing.

Twisting the mirror off the mirror mount will damage the rear catch.

If the rear catch is damaged, the mirror will be loose when installed and must be replaced.

Separate end caps (1) in direction of arrow from each other.

Turn interior mirror (2) and remove end caps (1).

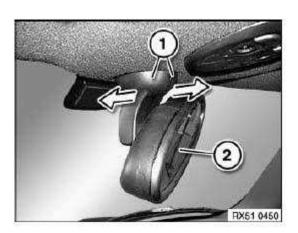
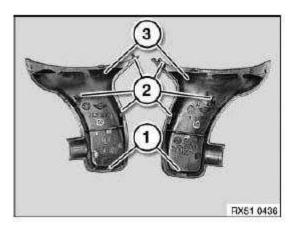


Fig. 55: Removing End Caps Courtesy of BMW OF NORTH AMERICA, INC.

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Installation:

Catches (1 and 2) of end caps (3) must not be damaged, replace if necessary.



<u>Fig. 56: Identifying Catches Of End Caps</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Do not snap interior mirror (1) out of mirror mount by turning.

Snap out interior mirror (1) from mirror mount towards front with increasing pressure (not abruptly) and remove.

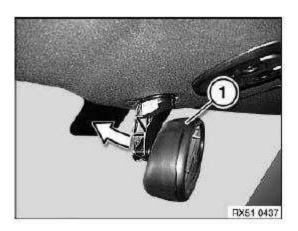


Fig. 57: Removing Interior Mirror From Mirror Mount Courtesy of BMW OF NORTH AMERICA, INC.

Version with cable (X):

Disconnect plug connection (1) and remove interior mirror (2).

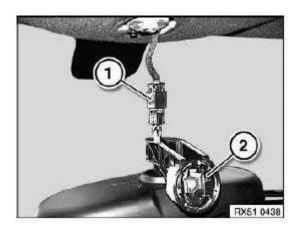


Fig. 58: Identifying Plug Connection And Interior Mirror Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- 1. Twist mirror foot by approx. 45° and fit to mirror mount.
- 2. Turn mirror foot until it engages on mirror base.



Fig. 59: Identifying Plug Connection And Interior Mirror Courtesy of BMW OF NORTH AMERICA, INC.

Only replace with version with remote control for central locking:

Initialize all transmitters (ignition keys), refer to owner's manual.

51 16 080 REMOVING AND INSTALLING OR REPLACING SUN VISOR AND LEFT OR RIGHT COUNTER SUPPORT

Release covers and release screws underneath.

Remove sun visor and counter support.

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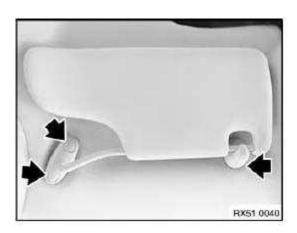


Fig. 60: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Version with interior light package:

Disconnect plug connection for sun visor.

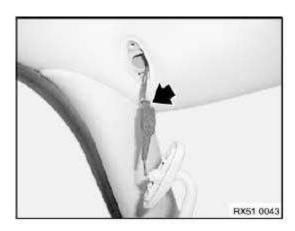
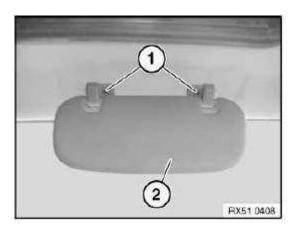


Fig. 61: Locating Plug Connection For Sun Visor Courtesy of BMW OF NORTH AMERICA, INC.

51 16 085 REMOVING AND INSTALLING/REPLACING SUN VISOR AND COUNTER-SUPPORT ON DRIVER'S SIDE (SIDE)

Unfasten screws (1) and remove sun visor (2).

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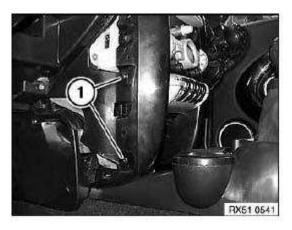
<u>Fig. 62: Identifying Sun Visor</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 16 160 REMOVING AND INSTALLING/REPLACING CENTRE CONSOLE TRIM

Necessary preliminary tasks:

- Remove lower trim from instrument panel
- Remove side center console panel
- Remove cover for instruments

Release screws (1) on both sides.



<u>Fig. 63: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unclip center console trim (1) from mountings (2) and pull back slightly.

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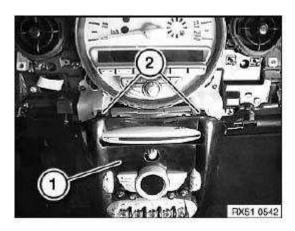


Fig. 64: Identifying Centre Console Trim And Mountings Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Remove center console trim.

Replacement:

- Remove operator unit for heater/air conditioner
- Remove AV connection socket

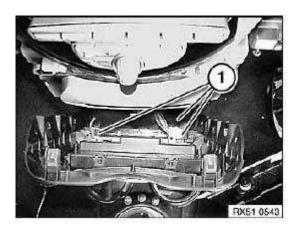


Fig. 65: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

51 16 196 REMOVING AND INSTALLING/REPLACING COVER (ARMREST) FOR CENTRE ARMREST

Slide cover (1) towards rear and snap at rear in direction of arrow out of center armrest (2).

Remove cover (1) towards rear.

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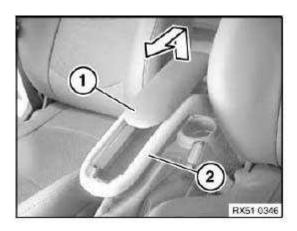
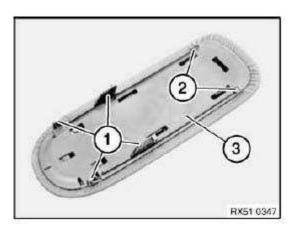


Fig. 66: Removing Cover From Centre Armrest Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Guides (1) and catches (2) on cover (3) must not be damaged.



<u>Fig. 67: Identifying Guides And Catches On Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 16 200 REMOVING AND INSTALLING/REPLACING STORAGE COMPARTMENT

Necessary preliminary tasks:

• Remove shift lever cover

Version with center armrest:

Release side screws on trims (1).

Unclip trims (1) in direction of arrow from each other and remove.

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Release screw (2).

Unclip drinks holder (3) in upward direction and remove.

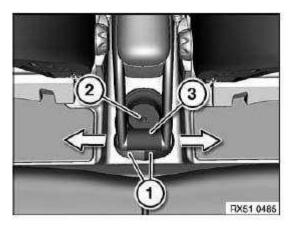


Fig. 68: Uncliping Trims
Courtesy of BMW OF NORTH AMERICA, INC.

Version without center armrest:

Release screw (1) and remove drinks holder (2).



<u>Fig. 69: Identifying Drinks Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unclip gaiter (1) towards top.

Release bolts (2).

Release storage compartment (3) at clips (4).

Raise storage compartment (3) slightly and disconnect associated plug connections.

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Feed out storage compartment (4) towards top.



Fig. 70: Identifying Gaiter, Storage Compartment And Clips Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove power socket
- Remove switch block
- Remove controller

51 16 206 REMOVING AND INSTALLING/REPLACING CENTRE ARMREST

Necessary preliminary tasks:

Version with telephone:

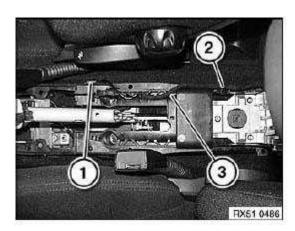
• Remove storage compartment

Version with telephone:

Disconnect plug connection (1).

Release cable holder (2) and feed out cable (3).

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<u>Fig. 71: Identifying Plug Connection, Cable Holder And Cable</u> Courtesy of BMW OF NORTH AMERICA, INC.

Version without telephone:

Release side screws on trims (1).

Unclip trims (1) in direction of arrow from each other and remove.

Release screw (2).

Unclip drinks holder (3) in upward direction and remove.

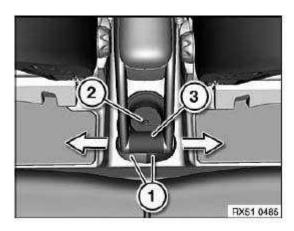


Fig. 72: Uncliping Trims
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) at sides.

Release screws (2) and lift out center armrest (3).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

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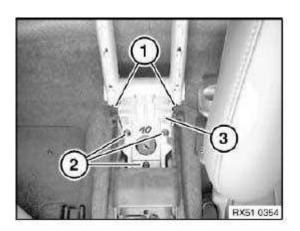
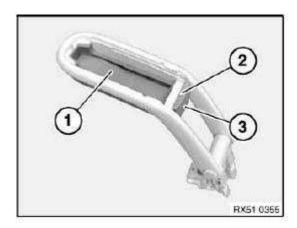


Fig. 73: Identifying Centre Armrest Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- o Remove cover for center armrest
- o Remove storage tray (1).
- o Release screw (2) and remove cover (3).
- o Remove eject box



<u>Fig. 74: Identifying Cover And Storage Tray</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 16 218 REMOVING AND INSTALLING/REPLACING REAR STORAGE COMPARTMENT HOLDER

Necessary preliminary tasks:

- Remove storage compartment
- If necessary, remove center armrest

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Release cable tie (1) and remove gaiter (2).

Unscrew nuts (3).

If necessary, release cable holder on holder (4).

Feed out holder (4) towards top.

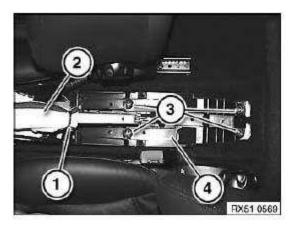


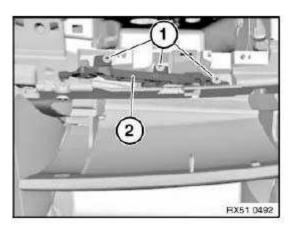
Fig. 75: Identifying Cable Tie, Holder And Gaiter Courtesy of BMW OF NORTH AMERICA, INC.

51 16 340 REMOVING AND INSTALLING/REPLACING LOCK FOR RIGHT GLOVEBOX

Necessary preliminary tasks:

• Remove knee protection, passenger's side

Release screws (1) and feed out lock (2).



<u>Fig. 76: Identifying Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

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51 16 345 REMOVING AND INSTALLING/REPLACING GLOVEBOX BUTTON

Special tools required:

• 00 9 340

Fit special tool 00 9 340 against side of button (1) and lever out.

Installation:

Catches (2) must not be damaged.

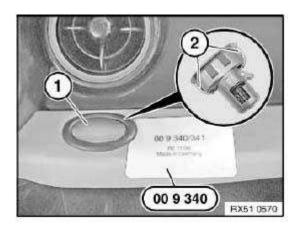


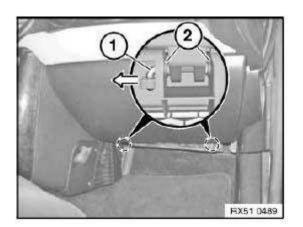
Fig. 77: Identifying Catches, Special Tool 00 9 340 And Button Courtesy of BMW OF NORTH AMERICA, INC.

51 16 365 REMOVING AND INSTALLING/REPLACING GLOVEBOX LID

Pull out hinge pin (1).

Installation:

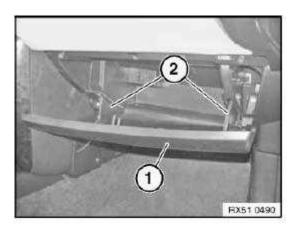
Sleeves (2) must not be damaged or missing.



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Fig. 78: Pulling Out Hinge Pin Courtesy of BMW OF NORTH AMERICA, INC.

Open glovebox lid (1) and feed out at guides (2).



<u>Fig. 79: Identifying Glovebox Lid And Guides</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Sleeves (1) on glovebox lid (2) must not be damaged or missing.

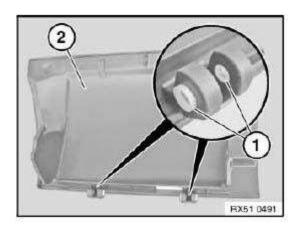


Fig. 80: Identifying Lock Courtesy of BMW OF NORTH AMERICA, INC.

51 16 450 REMOVING AND INSTALLING/REPLACING REAR LEFT/RIGHT GRAB HANDLE

Open covers in direction of arrow.

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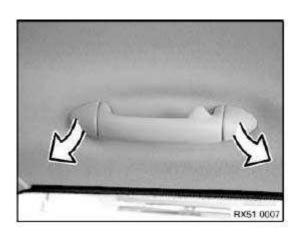


Fig. 81: Opening Covers
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove grab handle (2).

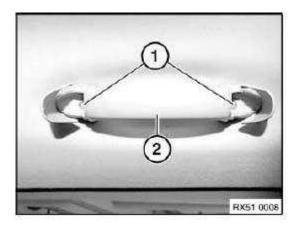


Fig. 82: Identifying Grab Handle Courtesy of BMW OF NORTH AMERICA, INC.

51 16 480 REMOVING AND INSTALLING OR REPLACING FRONT GRAB HANDLE

Fold finishers down and unfasten screws.

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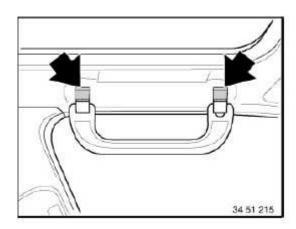
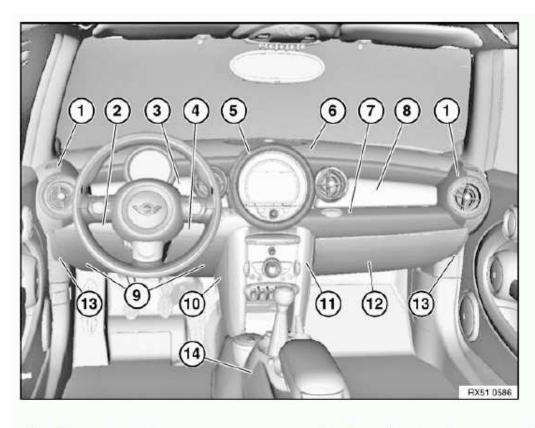


Fig. 83: Identifying Finishers
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 .. OVERVIEW OF INSTRUMENT PANEL

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- 1 Cover, air vent, side
- 2 Knee protection, driver's side, left
- 3 Decorative strip on instrument panel, left
- 4 Knee protection, driver's side, right
- 5 Cover, instruments
- 6 Trim, instrument panel upper section
- 7 Knee protection, passenger side
 - Carrier for instrument panel

- 8 Decorative strip on instrument panel, right
- 9 Instrument panel trim, bottom left
- 10 Trim, centre console, side
- 11 Trim, centre console
- 12 Glovebox lid
- 13 Instrument panel lower section
- 14 Centre console
 - Function carrier on centre console

Fig. 84: Identifying Instrument Panel Components Courtesy of BMW OF NORTH AMERICA, INC.

17 LIDS

41 63 003 REPLACING COVER BOWL

Necessary preliminary tasks:

- Remove servodrive for tank filler flap
- Remove rear left wheel arch trim
- Remove flap for fuel filler neck

NOTE: Carry over schematic representation to the relevant vehicle type.

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IMPORTANT: Deformation of the sheet metal flanges in the side panel and the wheel arch results in permanent vehicle leakage.

Carry out removal/installation with great care.

o (1) Cover bowl

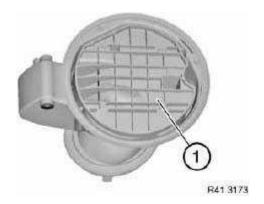


Fig. 85: Identifying Cover Bowl Courtesy of BMW OF NORTH AMERICA, INC.

MINI COOPER S:

Unclip tank cap and remove.

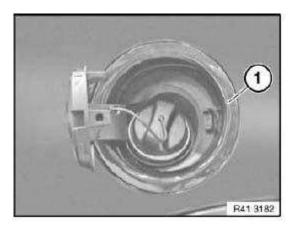


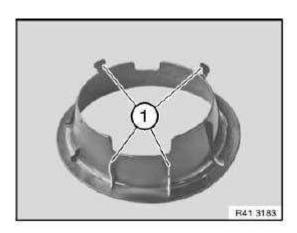
Fig. 86: Identifying Tank Cap Courtesy of BMW OF NORTH AMERICA, INC.

MINI COOPER S:

Installation:

Catches (1) must not be damaged.

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<u>Fig. 87: Identifying Catches</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and (2) on fuel filler pipe.

Tightening torque. Refer to <u>FUEL SUPPLY SYSTEM - TIGHTENING TORQUES -- 2007</u> <u>HATCHBACK</u>.

Installation:

Make sure ground cable (3) to connected to mounting.

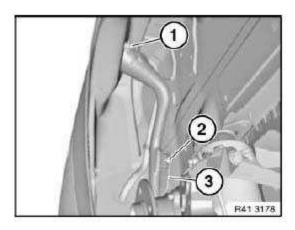
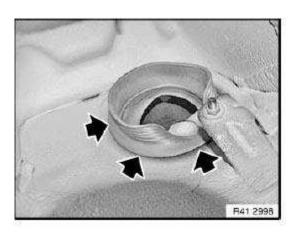


Fig. 88: Identifying Ground Cable And Fuel Filler Pipe Nuts Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustrations shows fuel filler pipe removed.

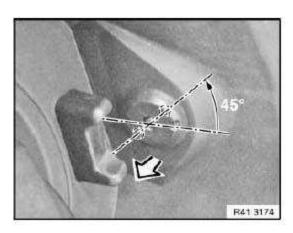
Release rubber seal from sheet metal flange.

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<u>Fig. 89: [Locating Rubber Seal]</u> Courtesy of BMW OF NORTH AMERICA, INC.

Turn sleeve (1) through approx. 45° and pull out in direction of arrow.



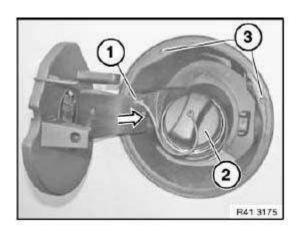
<u>Fig. 90: Pulling Out Sleeve</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press retaining strap (1) inwards and lift out (see arrow).

Remove cover (2).

Pierce cover bowl at markings (3) with a small screwdriver.

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<u>Fig. 91: Removing Retaining Strap</u> Courtesy of BMW OF NORTH AMERICA, INC.

Insert screwdriver to a depth of max. 5 mm and unlock cover bowl catch.

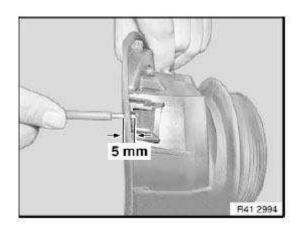


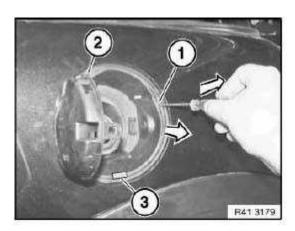
Fig. 92: Unlocking Cover Bowl Catch Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catches (1) and (2) in succession.

Lever out cover bowl in area (3) with plastic wedge.

IMPORTANT: Do not damage sheet metal flange of side panel.

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<u>Fig. 93: Unlocking Catches</u> Courtesy of BMW OF NORTH AMERICA, INC.

Carefully turn cover bowl (1) in direction of arrow and remove.

Installation:

Open hinge arm.

Insert cover bowl and engage sealing sleeve over fuel filler pipe.

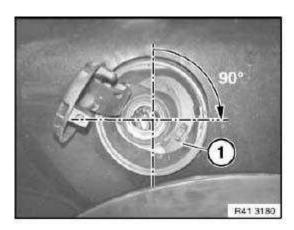
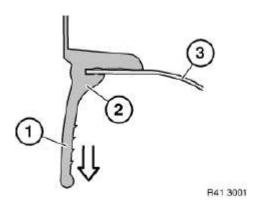


Fig. 94: Removing Cover Bowl Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Using fitting aid (1), pull sealing lip (2) over sheet metal flange of wheel arch (3).

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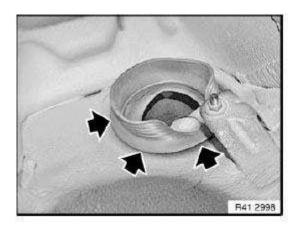


<u>Fig. 95: Identifying Fitting Aid, Sealing Lip And Wheel Arch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Illustrations shows fuel filler pipe removed.

Check that sealing lip is correctly seated.



<u>Fig. 96: [Locating Rubber Seal]</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Cover bowl must snap into place 3 times.

After installing, carefully check that cover bowl is securely seated.

There must be no discernible gap between sealing lip and side panel in area (1).

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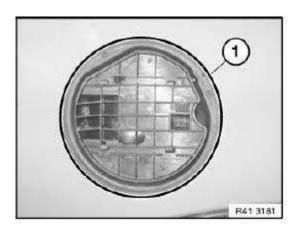


Fig. 97: Identifying Sealing Lip And Side Panel Contact Area Courtesy of BMW OF NORTH AMERICA, INC.

21 FRONT DOOR LOCKS, HANDLE

51 2. ... REMOVING WINDOW CAVITY COVER STRIP WITH SPECIAL TOOL 00 9 324 AT FRONT OR REAR

Special tools required:

- 00 9 318
- 00 9 324

Open complete door window glass.

Front door:

Insert special tool 00 9 324 at front (at A-pillar) in window cavity (1) (letters TOP pointing upwards).

Rear door:

Insert special tool 00 9 324 at rear (at C-pillar) in window cavity (2) (letters TOP pointing upwards).

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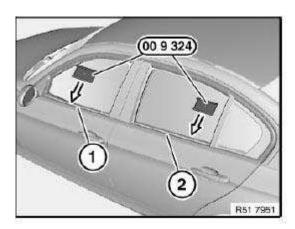


Fig. 98: Identifying Special Tool 00 9 324 And Window Cavity Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, picture shows inner door panel and door window glass removed.

Special tool 00 9 324 must be correctly guided under window cavity cover strip (1).

- 2 Short leg, bottom
- 3 Long leg, top (TOP)

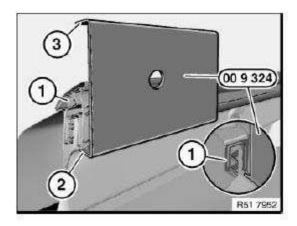


Fig. 99: Identifying Window Cavity Cover Strip And Special Tool 00 9 324 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Start at the front or rear, depending on the model.

IMPORTANT: Risk of damage!

Raise window cavity cover strip (3) no more than 5 mm in each levering

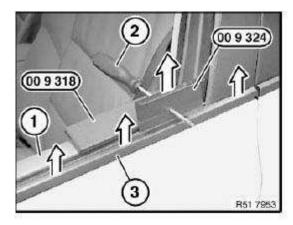
operation, otherwise the strip will be bent.

Position special tool 00 9 318 on door trim panel (1).

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Slide screwdriver (2) into special tool 00 9 324 and lever window cavity cover strip (3) upwards no more than 5 mm.

Guide special tools 00 9 324 and 00 9 318 towards front/rear and lever out window cavity cover strip (3) in the process.



<u>Fig. 100: Raising Window Cavity Cover Strip</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 21 003 REPLACING DOOR DETENT (LOCK STRIKER), FRONT LEFT OR RIGHT

Release screws (1).

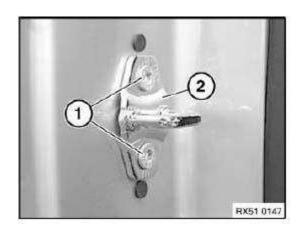
Remove door detent (2) with seal.

Installation:

Seal for door detent (2) must not be damaged.

Adjust door detent.

Tightening torque. Refer to <u>BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK</u>.



2007 ACCESSORIES AND BODY, CAB Body Equipment - Repair Instructions - Cooper

Fig. 101: Identifying Door Detent

Courtesy of BMW OF NORTH AMERICA, INC.

51 21 004 ADJUSTING FRONT LEFT OR RIGHT DOOR DETENT (LOCK WEDGE)

Operation is described in: 41 5. ... ADJUSTING DOOR.

51 21 090 REMOVING AND INSTALLING/REPLACING DOOR LOCK IN LEFT OR RIGHT FRONT DOOR

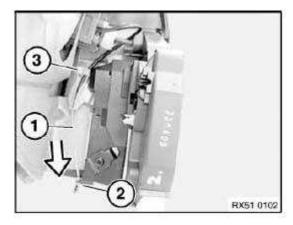
Necessary preliminary tasks:

• Remove door trim panel carrier

Disengage Bowden cable (1) from locking lever (2) and guide (3).

Installation:

Make sure Bowden cable (1) is correctly routed.



<u>Fig. 102: Disengaging Bowden Cable From Locking Lever And Guide</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release plug connection (1) and linkage (2) from door lock.

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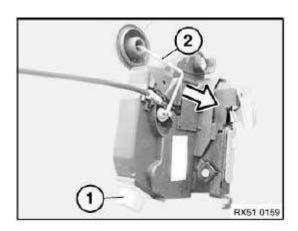
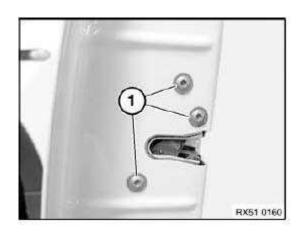


Fig. 103: Releasing Plug Connection And Linkage From Door Lock Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.



<u>Fig. 104: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Passenger side:

Feed out door lock (1).

Driver's side:

Feed out door lock (1) in area (A) from lock cylinder (2) and remove.

Installation:

Paddle (3) must be correctly inserted in door lock (1).

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Before being installed in the door, the guide of the door lock cable must be correctly positioned.

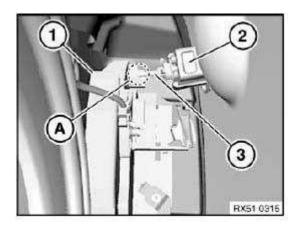


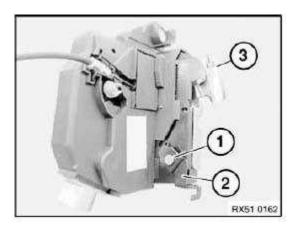
Fig. 105: Identifying Door Lock, Paddle And Lock Cylinder Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screw (1) and remove door lock lever (2).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Remove cable guide (3).

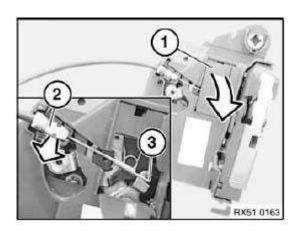


<u>Fig. 106: Identifying Door Lock Lever And Cable Guide</u> Courtesy of BMW OF NORTH AMERICA, INC.

Open cover (1).

Remove Bowden cable on holders (2 and 3) from door lock.

2007 ACCESSORIES AND BODY, CAB Body Equipment - Repair Instructions - Cooper



<u>Fig. 107: Removing Bowden Cable From Door Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 21 140 REMOVING AND INSTALLING/REPLACING COMPLETE LOCK CYLINDER IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks:

• Remove outside handle on front door

If necessary, remove rubber plug (1) and release screw (2).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

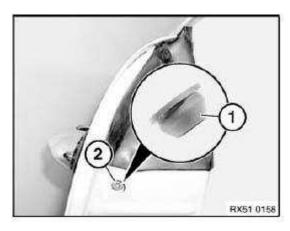
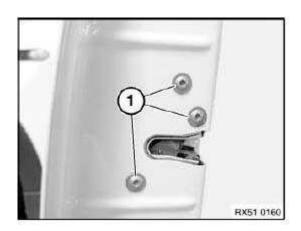


Fig. 108: Identifying Rubber Plug Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

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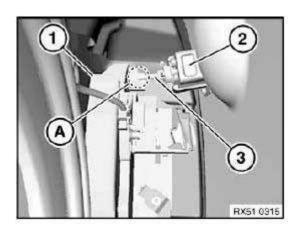
<u>Fig. 109: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position door lock (1) downwards a little.

Feed out lock cylinder (2) in area (A) and remove.

Installation:

Paddle (3) must be correctly inserted in door lock (1).

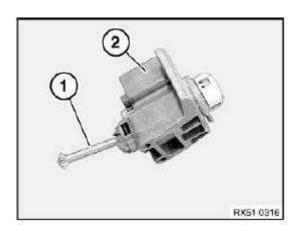


<u>Fig. 110: Identifying Door Lock, Paddle And Lock Cylinder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Paddle (1) on lock cylinder (1) must not be damaged or missing.

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<u>Fig. 111: Identifying Paddle On Lock Cylinder</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 21 150 BLOCKING, IF NECESSARY INITIALIZING, CAR KEY IN IMMOBILIZER CONTROL MODULE

NOTE: For method and further notes and instructions, refer to <u>AUDIO, NAVIGATION</u> AND ANTI-THEFT - REPAIR INSTRUCTIONS -- 2007 HATCHBACK.

51 21 170 REMOVING AND INSTALLING OR REPLACING OUTSIDE HANDLE FROM LEFT OR RIGHT FRONT DOOR

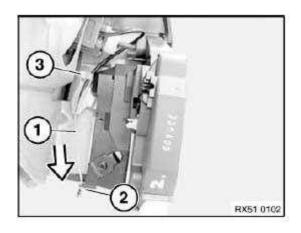
Necessary preliminary tasks:

• Remove door trim panel carrier

Disengage Bowden cable (1) from locking lever (2) and guide (3).

Installation:

Make sure Bowden cable (1) is correctly routed.



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<u>Fig. 112: Disengaging Bowden Cable From Locking Lever And Guide</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Screw (1) is accessible from inside of door through opening (2).

If necessary, lever out cover cap.

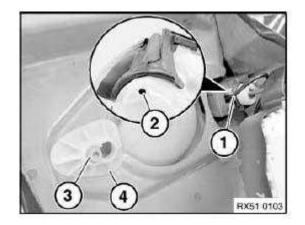
Release screw (1).

Release screw (3) and remove spacer (4).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Installation:

When fitting a new door handle, insert screws (self-tapping screws) in door handle prior to installation.



<u>Fig. 113: Identifying Spacer</u> Courtesy of BMW OF NORTH AMERICA, INC.

Feed out door handle (1).

Installation:

Make sure seals (2 and 3) are correctly seated

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Fig. 114: Feeding Out Door Handle Courtesy of BMW OF NORTH AMERICA, INC.

51 21 225 REMOVING AND INSTALLING OR REPLACING INSIDE DOOR OPENER IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks:

• Remove door trim panel carrier

If necessary, disconnect plug connection (2).

Release screws (1) and remove door opener (3).

Replacement:

Remove LED.

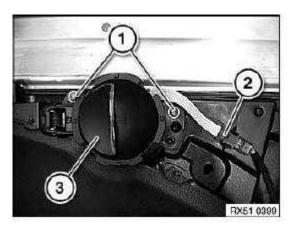


Fig. 115: Identifying Plug Connection And Door Opener Courtesy of BMW OF NORTH AMERICA, INC.

51 21 235 REMOVING AND INSTALLING/REPLACING BOWDEN CABLE FOR INSIDE DOOR OPENER ON LEFT OR RIGHT FRONT DOOR

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Operation is described in:

Removing and installing/replacing door lock in left or right front door. Refer to 51 FRONT SIDE DOORS.

51 21 280 REMOVING AND INSTALLING OR REPLACING DOOR BRAKE ON LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks:

- Remove door trim panel
- Remove door trim panel
- Close door window completely

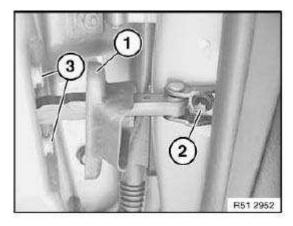
Feed seal (3) out of screws (1).

Unfasten screws (2).

Tightening torque. Refer to BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK.

Unscrew bolt (3).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.



<u>Fig. 116: Identifying Seal And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove door brake (1) through speaker opening (2).

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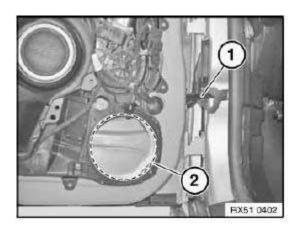


Fig. 117: Identifying Door Brake And Speaker Opening Courtesy of BMW OF NORTH AMERICA, INC.

51 21 300 REMOVING AND INSTALLING OR REPLACING WINDOW CAVITY COVER STRIP ON OUTSIDE OF LEFT OR RIGHT FRONT DOOR

Special tools required:

• 00 9 324

IMPORTANT: Observe procedure for using special tool 00 9 324.

Lower door window.

Lever out window cavity cover strip with special tool 00 9 324 (starting at B-pillar).

Installation:

Make sure that window cavity gaps (1) between A-pillar trim and rear window strip are correct.

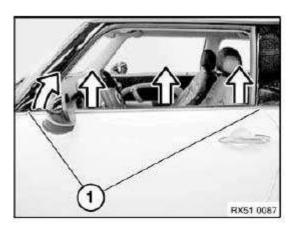


Fig. 118: Removing Window Cavity Cover Strip Courtesy of BMW OF NORTH AMERICA, INC.

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51 21 351 REPLACING WINDOW CAVITY COVER STRIP ON INSIDE OF FRONT DOOR

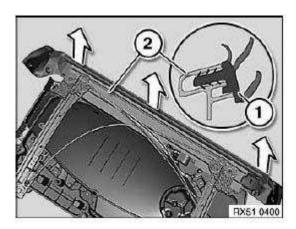
Necessary preliminary tasks:

• Remove door trim panel carrier

Pull window cavity cover strip (1) off retaining plate (2).

Installation:

Coat window cavity cover strip (1) with water before fitting.



<u>Fig. 119: Pulling Window Cavity Cover Strip Off Retaining Plate</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Only window cavity cover strips (1) with sealing lips (2) may be fitted.

Build date up to 12/2006:

In order to correctly install a new window cavity cover strip (1), it may be necessary to remove fleece (3) and transparent spacers from reinforcement (4).

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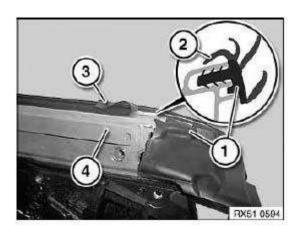
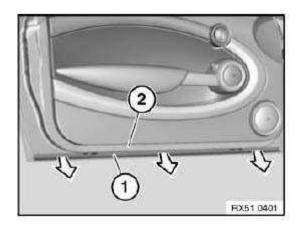


Fig. 120: Identifying Window Cavity Cover Strips, Fleece And Reinforcement Courtesy of BMW OF NORTH AMERICA, INC.

51 21 370 REMOVING AND INSTALLING/REPLACING COVER AT BOTTOM LEFT OR RIGHT ON FRONT DOOR

Detach cover (1) in direction of arrow from front door (2).



<u>Fig. 121: Detaching Cover From Front Door</u> Courtesy of BMW OF NORTH AMERICA, INC.

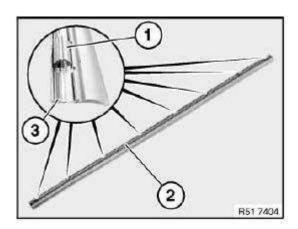
Installation:

Catches (1) of cover (2) must not be damaged.

Cover (2) has an aluminum insert (3).

Only press on catches (1) when installing otherwise cover (2) will become uneven.

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<u>Fig. 122: Identifying Catches, Cover And Aluminum Insert</u> Courtesy of BMW OF NORTH AMERICA, INC.

23 HOOD LATCH, LOCKS

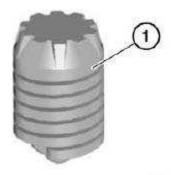
51 23 ... ADJUSTING/REPLACING BUMP STOPS

The illustrations are schematic representations and are to be applied to the relevant vehicle type.

Version 1:

Following parts must not be damaged:

o (1) Bump stop



FI41 2156

<u>Fig. 123: Identifying Bump Stop</u> Courtesy of BMW OF NORTH AMERICA, INC.

Adjust bump stop (1) to correct height by turning left or right.

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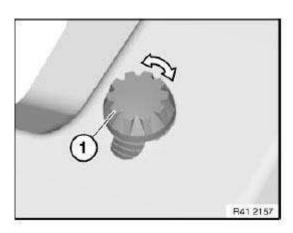


Fig. 124: Adjusting Bump Stop Courtesy of BMW OF NORTH AMERICA, INC.

Version 2:

Replace damaged bump stops.

o (1) Bump stop with ejector



Fig. 125: Identifying Bump Stop With Ejector Courtesy of BMW OF NORTH AMERICA, INC.

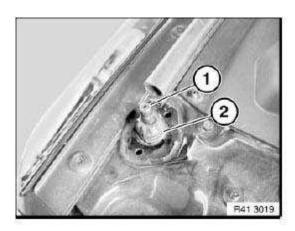
Press ejector (1) into bump stop and, in this position, twist approx. 90° counterclockwise with a Phillips screwdriver.

This locks the ejectors (1) in the bump stops.

Adjust bump stop (2) to correct height by turning left or right.

Unlock the ejector (1) again after completing adjustment.

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<u>Fig. 126: Identifying Ejectors And Bump Stop</u> Courtesy of BMW OF NORTH AMERICA, INC.

Version 3:

Replace damaged bump stops.

o (1) Bump stop



FI41 2146

Fig. 127: Identifying Bump Stop Courtesy of BMW OF NORTH AMERICA, INC.

Turn lock (1) 45° counterclockwise.

Pull bump stop (2) upwards.

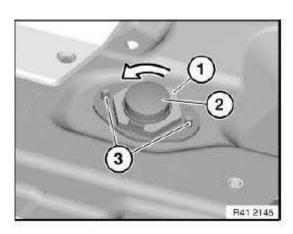
Close lid slowly until it is at the same height as the side panel.

Open lid and turn lock (1) clockwise.

Installation:

Press bump stop into panel and drive in expanding pins (3).

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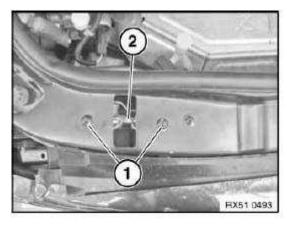


<u>Fig. 128: Turning Lock Counterclockwise</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 23 100 REMOVING AND INSTALLING/REPLACING RIGHT ENGINE HOOD/BONNET LOCK

Release screws (1) and feed out hood/bonnet lock (2) sideways.

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.



<u>Fig. 129: Identifying Hood/Bonnet Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disengage Bowden cable (1) from hood/bonnet lock.

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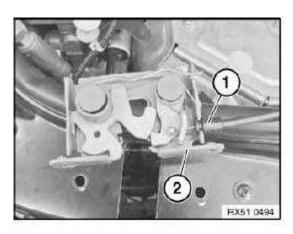


Fig. 130: Identifying Bowden Cable Courtesy of BMW OF NORTH AMERICA, INC.

51 23 110 REMOVING AND INSTALLING/REPLACING LEFT HOOD/BONNET LOCK

Release screw (1).

Feed out expansion tank (2) and lay to one side.

Release screws (4) and feed out hood/bonnet lock (3).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

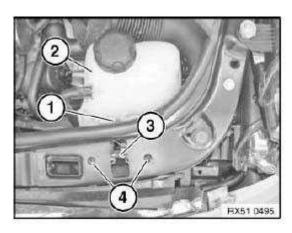


Fig. 131: Identifying Expansion Tank And Hood/Bonnet Lock Courtesy of BMW OF NORTH AMERICA, INC.

Disengage Bowden cable (1) in direction of arrow from hood/bonnet lock (2).

2007 ACCESSORIES AND BODY, CAB Body Equipment - Repair Instructions - Cooper

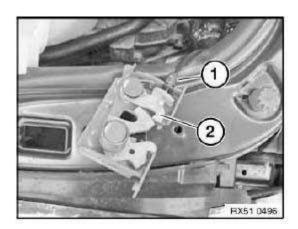


Fig. 132: Identifying Bowden Cable And Hood/Bonnet Lock Courtesy of BMW OF NORTH AMERICA, INC.

51 23 160 REMOVING AND INSTALLING/REPLACING ARRESTER HOOK ON ENGINE HOOD

Release screws (1) and remove arrester hook (2).

Installation:

Adjust arrester hook (2) to lock carrier.

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

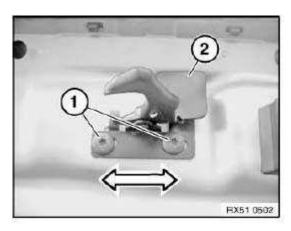


Fig. 133: Adjusting Arrester Hook To Lock Carrier Courtesy of BMW OF NORTH AMERICA, INC.

51 23 200 REMOVING AND INSTALLING/REPLACING LEVER WITH BRACKET FOR HOOD/BONNET FASTENER

Necessary preliminary tasks:

• Remove left entrance cover strip.

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Unscrew nut (1).

Remove lever (2) and disengage Bowden cable (3).

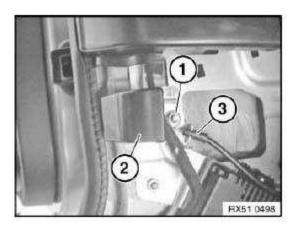


Fig. 134: Identifying Lever And Bowden Cable Courtesy of BMW OF NORTH AMERICA, INC.

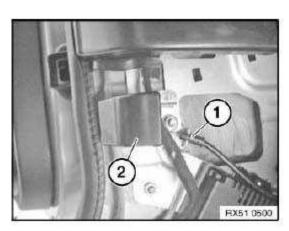
51 23 212 REMOVING AND INSTALLING/REPLACING CABLE FOR FRONT ENGINE HOOD/BONNET LOCKS (IN PASSENGER COMPARTMENT)

Necessary preliminary tasks:

- Remove left for cowl panel cover.
- Remove left entrance cover strip.

Disengage cable (1) at lever (2).

If necessary, disengage cable (1) at guide clips up to bulkhead.

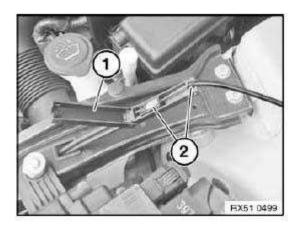


<u>Fig. 135: Identifying Cable And Lever</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Lever out coupling (1) and open.

Disengage cable (2).



<u>Fig. 136: Identifying Coupling And Cable</u> Courtesy of BMW OF NORTH AMERICA, INC.

Feed cable (1) out of front bulkhead (2).

Feed cable (1) with grommet (3) out of rear bulkhead.

Installation:

Make sure grommet (3) is correctly seated on rear bulkhead.

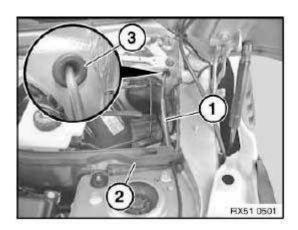


Fig. 137: Identifying Cable, Front Bulkhead And Grommet Courtesy of BMW OF NORTH AMERICA, INC.

51 23 215 REMOVING AND INSTALLING/REPLACING CABLE FOR FRONT HOOD/BONNET LOCKS (IN ENGINE COMPARTMENT) ON RIGHT AND LEFT

Necessary preliminary tasks:

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• Remove both hood/bonnet locks.

Unclip coupling (1) from lock carrier (2).

Open coupling (1) and disengage cable (3).

If necessary, release cable (4) from retainers at lock carrier (2).

Feed out coupling (1) with cable (4).

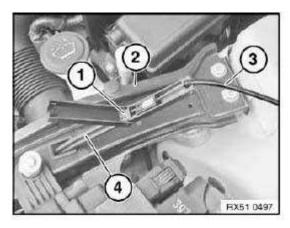


Fig. 138: Identifying Coupling, Lock Carrier And Cable Courtesy of BMW OF NORTH AMERICA, INC.

51 23 265 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT GAS STRUT FOR ENGINE BONNET/HOOD

WARNING: Danger of injury!

Support engine hood/bonnet in fully opened position with suitable apparatus.

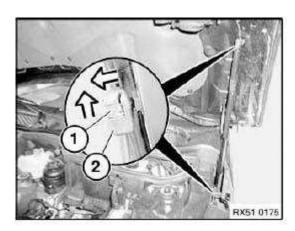
Make a written record of the installation position of the gas struts before removing.

If necessary, release cable holder on gas strut (2).

Slide stop spring (1) to end of gas strut (2) and lever out gas strut (2) from ball head.

Repeat procedure at other end of gas strut (2).

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<u>Fig. 139: Removing Gas Strut From Ball Head</u> Courtesy of BMW OF NORTH AMERICA, INC.

24 TRUNK LATCH, LOCKS

51 24 004 ADJUSTING REAR LID LOCK

NOTE: Rear lid must be correctly adjusted before adjustment of rear lid lock.

If necessary, adjust trunk lid.

Necessary preliminary tasks:

- Screw in rear lid bump stops completely
- Remove trim on tail panel.

Adjusting rear lid lock:

Slacken screws (1) on rear lid lock (3) until lock is just able to be move and centers itself.

Close rear lid and keep release button pressed so that rear lid lock snaps closed.

Striker (2) must be centrally positioned in rear lid lock (3).

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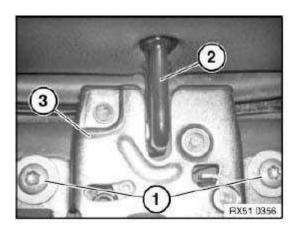


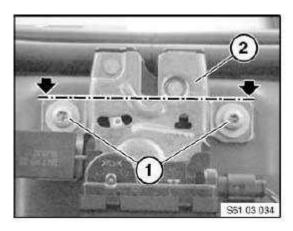
Fig. 140: Identifying Rear Lid Lock And Striker Courtesy of BMW OF NORTH AMERICA, INC.

Open rear lid.

Adjust rear lid lock (2) vertically so that upper edges of shims are flush with edge of rear lid lock (2).

Tighten down screws (1).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.



<u>Fig. 141: Identifying Rear Lid Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

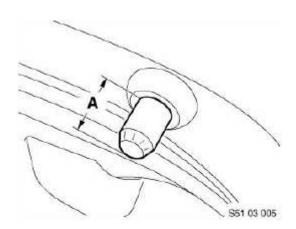
Adjust bump stops on left/right by turning.

Adjust bump stops to dimension (A).

A=35 mm

Check alignment of rear lid and rear lid lock; if necessary, screw in bump stops by approx. 1 mm.

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<u>Fig. 142: Identifying Bump Stops Adjusting Dimension</u> Courtesy of BMW OF NORTH AMERICA, INC.

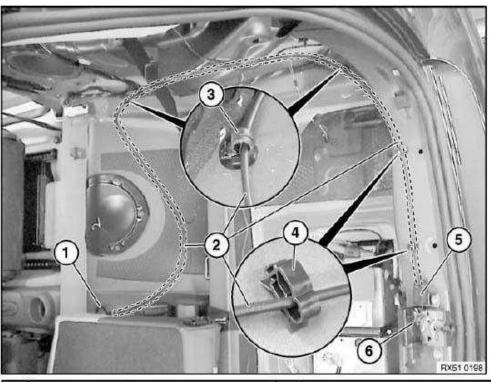
51 24 065 REMOVING AND INSTALLING / REPLACING BOWDEN CABLE FOR MANUAL REAR LID UNLOCKING

Necessary preliminary tasks:

- Remove side trim panel at rear right.
- Disconnect Bowden cable for manual rear lid lock unlocking.

Removing Bowden cable for manual rear lid unlocking:

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1	Pull eye	4	Cable holder	
2	Bowden cable	5	Rear lid lock	
3	Cable holder	j		

<u>Fig. 143: Identifying Pull Eye, Cable Holder, Bowden Cable And Rear Lid Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

Feed Bowden cable (2) out of cable holders (3 and 4).

Unclip Bowden cable (2) from pull eye (1).

Lever grommet (3) out of holder (4) and feed out.

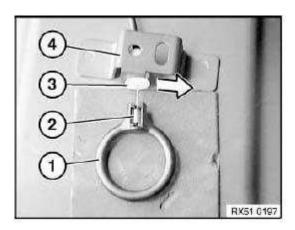


Fig. 144: Removing Grommet From Holder

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Courtesy of BMW OF NORTH AMERICA, INC.

51 24 100 REMOVING AND INSTALLING/REPLACING REAR LID LOCK

Necessary preliminary tasks:

• Remove trim from rear apron.

Version with manual unlocking:

Lift housing (1) in direction of arrow out of rear lid lock (2).

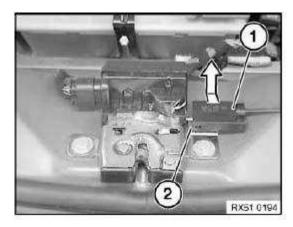


Fig. 145: Lifting Housing Out Of Rear Lid Lock Courtesy of BMW OF NORTH AMERICA, INC.

Version with manual unlocking:

Press mounting (2) outwards with screwdriver (1).

Turn housing (4) forwards and disconnect Bowden cable nipple (3) upwards.

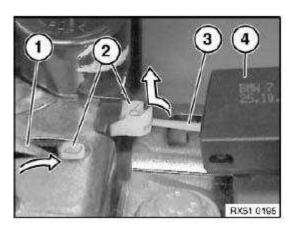


Fig. 146: Disconnecting Bowden Cable Nipple

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Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The work scope "Disconnecting Bowden cable for rear lid lock emergency unlocking" ends here.

Disconnect plug connection (1).

Release screws (2) and remove rear lid lock (3).

Installation:

Adjust rear lid lock.

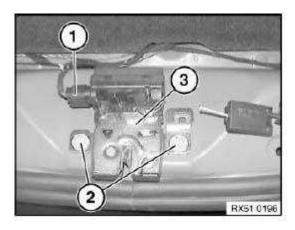


Fig. 147: Identifying Rear Lid Lock And Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

51 24 130 REMOVING AND INSTALLING/REPLACING STRIKER FOR REAR LID LOCK

Necessary preliminary tasks:

• Remove panel for rear lid.

Unfasten screws (1) and remove striker (2).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

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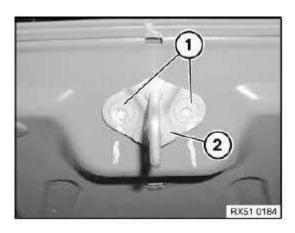


Fig. 148: Identifying Striker
Courtesy of BMW OF NORTH AMERICA, INC.

51 24 300 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT GAS STRUT FOR REAR LID

WARNING: Danger of injury!

Support rear lid in fully opened position with suitable apparatus.

Make a written record of the alignment of the gas pressure support(s) before removing.

Slide stop spring (1) to end of gas strut (2) and lever out gas strut (2) from holder.

Repeat procedure at other end of gas strut (2) and remove gas strut (2).

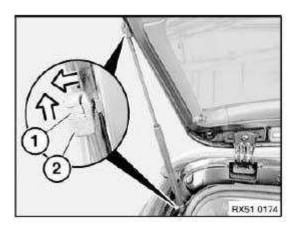


Fig. 149: Removing Gas Strut From Holder Courtesy of BMW OF NORTH AMERICA, INC.

31 FRONT AND REAR WINDOW

51 31 ... INSTRUCTIONS ON GLUING WINDSCREEN

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IMPORTANT: The following topics were included or amended in March 2005:

Storage temperature of all adhesive products of 5°C to 25°C must be observed.

Special instructions for hot processing must be observed:

- Temperature of cartridge oven must be checked every morning with DIS or GT1
- Temperature of cartridge < 80°C results in the formation of bubbles/blisters (gluing/cementing not permitted)
- Insufficient heating (< 1 hour) results in the formation of bubbles/blisters (gluing/cementing not permitted)
- Heating time or a cartridge max. 8 hours
- Mistake in mixing in event of an interruption in application >1 minute (gluing/cementing not permitted)
- A test bead of 50...70 mm must be rejected after an interruption in application
- Cartridge may only be heated up once; if the lower label is black, this adhesive may only still be used cold without accelerator while adhering to the Best before date.

These instructions are not applicable to door window cementing (door "center") on the E38/L7:

Work steps for removing and installing windscreens:

o is displayed at the end of this document by clicking on the "framed cross-reference"

General:

The windscreen and rear window (also the rear side windows if necessary) are bonded to the body. This gluing will increase the torsional strength of the vehicle. To obtain perfect bonding, comply with the installation procedure described in the following.

It is possible to tow or drive without windscreen or rear window.

The windscreen must be secured with yellow plastic adhesive tape (sourcing reference: BMW Parts Service) after being installed. The paint must be completely hardened after painting work.

- o Set down window glass and process on BMW-approved X-universal stand.
- o In winter, the vehicles must stand in a room with a temperature of at least 15°C.

On-the-job safety:

When working with adhesive products (adhesive, cleaning agent, bonding agent etc.):

- Wear protective goggles, protective gloves and if necessary an apron.
- o Ensure rooms are well ventilated.

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- o Change work clothing contaminated with adhesive immediately.
- o Change work clothing contaminated with solvents and swelling agents immediately (keep spare work clothing on hand).
- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams
- o Provide eye bath facilities, change water regularly (once a month).
- o Comply with the relevant safety regulations
- o Do not eat, drink or smoke in areas of PUR processing.

Replacement of windscreens:

Version with head-up display (HUD):

o Marking for HUD must be present on the windscreen

Version with front passenger airbag:

Stick on reminder label

Tools for cutting through adhesive bead:

TOOLS FOR CUTTING THROUGH ADHESIVE BEAD

Туре	Model	Order/part number
Special cutter (manufacturer: Fein) with oscillating blade	Pneumatically operated	81 43 9 429 183
	Electrically operated	81 43 9 427 786
BMW blade set	All required blades	81 43 9 428 596
Blade (U-shape)	19.5 mm ⁽¹⁾	6 39 03 118 01 3
	24 mm	6 39 03 076 01 6
	36 mm	6 39 03 079 01 2
	45 mm	6 39 03 154 01 0
Blade (straight with stop roller)	16 to 35 mm (adjustable)	6 39 03 143 01 3
	10 mm (fixed) (1)	6 39 03 189 01 0
	14 mm (fixed)	6 39 03 082 01 6
"Roll Out 2000 "	Wire cutting system (1)	81 62 0 301 76 8
Scalpel	for heavy-duty applications (1)	
Handles for cutting wire	Self-locking (1)	special tool 51 3 270
(1) Not included in BMW blade set	•	•

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Storage temperature:

Storage temperature of all adhesive products of 5°C to 25°C must be observed.

Adhesive:

The BMW-approved 1-component polyurethane adhesive must be used for bonding.

- o Adhesive cartridge* (part number BMW 83 19 0 152 031, MINI 83 19 0 152 032)
- * Sourcing reference: BMW Parts Service

Adhesive is applied to window glass with cartridge gun (pneumatically or electrically operated, sourcing reference: BMW Workshop Equipment and Planning Documentation).

When using accelerator (hot processing):

- o Temperature (min. 80 ± 5 °C) of cartridge oven must be checked every morning. Connect temperature sensor to DIS or GT1 (in conjunction with MIB (Measurement Interface Box))
- Heat adhesive for at least 1 hour in cartridge oven (sourcing reference: BMW Parts Service) to 80 ± 5 °C
 - o Write date and time on adhesive when inserting into cartridge oven
 - Insufficient heating (< 1 hour) results in the formation of bubbles/blisters (gluing/cementing not permitted)
 - \circ Temperature $< 80 \pm 5$ °C results in the formation of bubbles/blisters (gluing/cementing not permitted)
- o Remove cured adhesive prior to further processing.
- o Mistake in mixing in event of an interruption in application >1 minute (gluing/cementing not permitted)
 - o A test bead of 50...70 mm must be rejected after an interruption in application
- o Best before dates of accelerator and adhesive must not be more than 3 months apart
 - Best before date >3 months results in the formation of bubbles/blisters (gluing/cementing not permitted)

Sealed adhesive:

- \circ May only be stored for a maximum of 8 hours once it has been heated up to 80 ± 5 °C.
- o The adhesive will be damaged if this time is exceeded (gluing/cementing not permitted)
- o Damaged adhesive must not be used and must be disposed of in compliance with national regulations
- o Cartridge may only be heated up once
 - o If the lower label is black, this adhesive may only still be used cold without accelerator while adhering to the Best before date.

IMPORTANT: Not all window glass may be bonded with accelerator (hot processing).

If hot processing is not permitted, this is described in the relevant document.

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Adhesive Best before date:

Repair kit and adhesive cartridges are marked with a date (Best before).

The adhesive cannot be used after this date.

Adhesive disposal:

Pure hardened adhesive is handled as normal waste

The adhesive is disposed of in paper bags so that it can react with moisture.

Non-hardened adhesive, cartridges and mixtures of adhesive and solvents and the like must be disposed of as special waste.

Accelerator:

Accelerator is screwed onto the adhesive cartridge and contains a reaction paste which is mixed with the heated adhesive.

IMPORTANT: The accelerator may only be paired with the adhesive cartridge of an unopened package (bubbling).

Adhesive and accelerator must be paired while taking into account the Best before dates.

The accelerator may no longer be used if the Best before dates are more than 3 months apart.

Bonding agent (activator):

The BMW-approved bonding agents must be used to treat bonding areas:

- o "Glass Activator 1" (on glass ceramic material)
- o "Paint Activator A" (on sheet metal flange or residual adhesive bead)

Bonding agent Best before date:

Repair kit and bonding agent are marked with a date (Best before).

- o The bonding agent may only be used up to this date (if not already opened previously).
- o Once it has been opened (locking ring broken), use for 1 week only even if the Best before date has not been reached.

NOTE: Write the date on the bottle when opening the bonding agent for the first time. Close the bottle immediately after extracting the bonding agent (reaction with air).

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Removal of window glass:

IMPORTANT: As of E63 and E87 it will only be possible to remove the rear window with the "Roll Out 2000".

Cover side panels, roof antenna and if necessary interior trim with protective covers.

Tape off body with fabric adhesive tape (e.g. Tesa) in areas where the oscillating blade could damage the window glass or the paint.

When using cutting wire, pull cutting wire ends through special tool 51 3 270, bend and tape off with fabric adhesive tape (e.g. Tesa) (risk of injury and damage).

When removing the windscreen:

Wear protective goggles and gloves.

Cut through adhesive bead of window glass:

- o with "Roll Out 2000" * (wire cutting system); no paint is damaged here in the case of narrow gaps
- o with special cutter* and oscillating blade*
- o *Sourcing reference: BMW Workshop Equipment and Planning Documentation

Prior to each use, regrind the blade with a grinding stone while the machine is running (new blades also).

Avoid damage to paintwork on body cutout.

Guide blade carefully between body and window glass.

Run blade of knife parallel to glass.

Cut through adhesive bead as closely as possible to window glass.

To remove adhesive bead in body cutout (and on window glass if reusing):

- o Use a scalpel for heavy-duty applications
- $\circ~$ Cut off residual adhesive to a thickness of approx. 0.5 mm
- o Remove residual bead only briefly before bonding

Damage to paintwork in body aperture:

To ensure long-term corrosion protection, it is absolutely essential to touch up damage to paintwork!

The "BMW Color System" painting handbook forms the basis of these repair instructions and must be observed without fail.

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Touch up damage to paintwork on body cutout with BMW multibase filler.

Grind out scratches in non-visible areas and touch up with BMW multibase filler.

Grind extensive areas of damage down to the bare metal and coat with BMW multibase filler (coating thickness 30 ... 40 ace; µm).

Hardening time:

- o With infrared, at least 10 minutes
- o Without infrared for at least 60°C, at least 30 minutes
- o Without infrared for at least 20°C, at least 24 hours

If a complete build-up of paint is required in the visible area:

o Tape off primed bonding flange before applying top coat

IMPORTANT: Observe hardening time of BMW multibase filler otherwise a perfect bond cannot be guaranteed!

Treatment of glued area in body:

TREATMENT OF GLUED AREA IN BODY

Glue	Treatment	
	a. Clean with spirit (available in pharmacies).	
Bonding and sealing compound for	b. Observe an air drying time of at least 1 minute (at least 15 minutes when applied to residual bead)	
car window glass	c. Apply "Paint Activator A" to paint and residual bead	
	d. Observe an air drying time of at least 1 minute (at least 10 minutes when applied to residual bead)	

IMPORTANT: Do not use Sika remover 208 for cleaning in the bonding area.

Preparation for assembly:

Prepare plastic nozzle(s) for shaping adhesive bead (when not using the standard nozzle), can be cut to size during the air drying time.

Lay a test bead of approx. 50 mm - watch out for formation of bubbles/blisters when hot cementing; if OK, apply immediately to window glass.

o Interruption must be < 5 second (incorrect mixture ratio).

Cartridge must be vertical to window glass.

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Black ceramic material impermeable to UV light is located on the peripheral zone of the inside edge of the window to protect the adhesive bead.

Glass ceramic material must not be damaged and must be treated as follows.

Treatment of glass ceramic surface (inside of window):

TREATMENT OF GLASS CERAMIC SURFACE (INSIDE OF WINDOW)

Adhesive (with part numbers)	Treatment	
Hot cementing: o BMW 83 19 0 147 370, MINI 83 19 0 147 372		
Cold cementing: o BMW 83 19 0 147 369, MINI 83 19 0 147 371	 a. Clean with spirit (available in pharmacies). b. Observe an air drying time of at least 1 minute c. Apply a thin coating of "Glass Activator 1" d. Observe an air drying time of at least 10 minutes 	
Adhesive cartridge:		
o BMW 83 19 0 152 031, MINI 83 19 0 152 032		

Version with inspection window for vehicle identification number in windscreen only (all except US/GB):

o Seal inspection window (bottom left) with Sika primer 206 G+P

Adhesive quantities:

Approx. 1 1/4 adhesive cartridges are needed to cement 7 Series windscreens.

In the case of hot cementing (with accelerator), the missing residual bead is applied from a second adhesive cartridge (not contained in the repair kit) but while cold and without accelerator (bubbling).

Minimum hardening period is thus not increased.

IMPORTANT: If a second cartridge is required for cementing:

- o First apply cold adhesive to cowl panel at bottom (skin formation time)
- Accelerator from repair kit must not be used with the second cartridge (bubbling)

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Bubbling results in leakage and insufficient bonding strength (torsional rigidity, passenger airbag).

Effect of differing adhesive quantities:

EFFECT OF DIFFERING ADHESIVE QUANTITIES

Too little adhesive:	Too much adhesive:
 Windscreen rests too low in body cutout 	 Windscreen rests too high in body cutout Wind noise may occur
 Strains/tensions may occur (windscreen breakage) Insufficient squeezing of adhesive bead (leaking) 	 Strains/tensions may occur (windscreen breakage) Fouling of add-on parts by emerging adhesive Adhesive on uninsulated strainer pressure lines of antenna(s) (interference of reception)

Spacer buffers:

Before sticking on new spacer buffers, remove all remaining traces of old spacer buffers completely.

Position of spacer buffers must be observed exactly.

Incorrectly fitted spacer buffers will result in:

- Windscreen glass breakage
- Leakage (if the spacer buffer is in the adhesive area)
- Wind noises

Assembly:

To prevent a pressure increase in the vehicle interior when the doors are closed:

Open a window

IMPORTANT: After the adhesive bead has been applied, the window glass must be fitted within 5 to 10 minutes (depending on air humidity, temperature and use of accelerator).

After 5 to 10 minutes the adhesive bead forms a skin which can no longer guarantee a perfect bond.

To secure the windscreen, use only the yellow plastic adhesive tape (sourcing reference: BMW Parts Service, part number 83 19 9 410 979).

The glass will slip down if other adhesive tapes are used.

Windscreen slippage will result in leaks and wind noises.

Remove adhesive residue immediately with adhesive remover (Sika remover 208, sourcing reference: BMW Parts Service). Do not press out the window glass again.

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Hardened adhesive can only be removed by machine.

Check height of windscreen/rear window with special tool 51 0 010 or 51 3 210.

Assemble car.

Hardening:

The adhesive hardens as it reacts with air humidity (with accelerator also due to mixed-in reaction paste) at room temperature.

Minimum hardening time (table) is obtained from 22°C and 38 % relative air humidity.

At ambient temperatures above 23°C and 50 % relative air humidity (hot countries), the adhesive open time is shortened to approx. 5 minutes (skin formation time).

The adhesive hardening process is interrupted completely at ambient temperatures below 5°C. In this event, there will be no increase in the strength of the adhesive bond.

Do not subject the vehicle to load on one side during the minimum hardening time, such as:

- o one wheel on curb
- o lifting platform
- o etc.

Maneuvering inside garage/workshop:

- o only permitted on level ground
- o do not under any circumstance driver over access ramps, e.g. into multi-store car parks

Remove adhesive tapes after hardening time.

If you fail to adhere to the minimum hardening times:

o leaks and wind noises will occur when the windscreen is moved

Glues and their minimum hardening times:

GLUES AND THEIR MINIMUM HARDENING TIMES

Glue	passenger airbag" (after which	Minimum hardening time "with passenger airbag" (countries where seatbelt use is not required by law)
Hot processing with accelerator	2 hours	3 hours*
Cold processing	9 hours	20 hours*

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NOTE: Vehicles with passenger airbag:

The vehicle can be handed over to the customer after the hardening period (vehicle can be moved, adhesive-dependent) with the following warning:

Once the windscreen glass has been bonded, all occupants must travel with their seatbelts attached for "... hours"!

The time is taken from the "Minimum hardening period" table for countries where seatbelt use is not required by law.

IMPORTANT: If the minimum hardening time is not adhered to:

 the front passenger together with the windscreen may fall out of the vehicle in the event of an accident after the front passenger airbag has been triggered

Locate leaks:

- o by spraying water underneath sealing lips
- o with ultrasonic leak detector (sourcing reference: BMW Parts Service)

If necessary, seal leakage with appropriate nozzle.

Version with GPS navigation system 1 (up to 9/97):

After installation of rear window:

- o Recalibrate magnetic field sensor
- o Refer to **COMMUNICATIONS**.

Version with rain sensor or rain/light sensor:

Remove rain sensor or rain/light sensor.

After replacing windscreen:

- o Initialize rain sensor or rain/light sensor
- o Refer to **COMMUNICATIONS**.

Version with fogging sensor:

After replacing windscreen:

Replace fogging sensor.

Version with head-up display (HUD):

Before bonding, install windscreen with seal(s) and check HUD; if necessary, press expanding foam tape down

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with hand roller

After bonding windscreen, check and if necessary adjust HUD.

NOTE: If no document is displayed after you have clicked on a "framed cross-

reference":

It is not necessary or permitted for the model selected in the TIS.

51 31 ... REMOVING AND INSTALLING/REPLACING RETAINING STRIP FOR COWL PANEL COVER

Necessary preliminary tasks:

• Remove cover for cowl panel on left

IMPORTANT: Retaining strip (1) has an aluminum profile insert (2).

Carefully wind out retaining strip (1) (windscreen breakage).

- 3 Glue bead
- 4 Windscreen

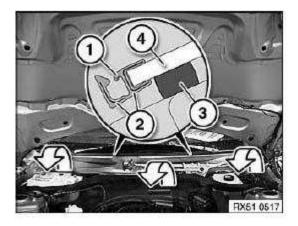


Fig. 150: Removing Retaining Strip Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean windscreen.

Pay attention to center marking on retaining strip (1) and windscreen.

Insert positioner (2) for retaining strip (1) must be removed after it has been fitted on the windscreen but before the windscreen itself is installed.

Replacement of retaining strip without windscreen removal:

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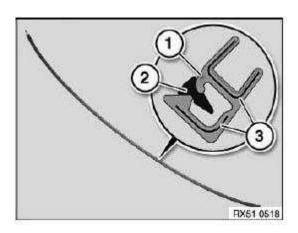
If adhesive has managed to get onto retaining strip (1), this area must be cut out partially.

To facilitate installation, moisten body cutout with water and fit retaining strip.

Replacement of retaining strip with removed or new windscreen:

Fit rubber frame (1).

3 Aluminum strip



<u>Fig. 151: Identifying Insert Positioner For Retaining Strip</u> Courtesy of BMW OF NORTH AMERICA, INC.

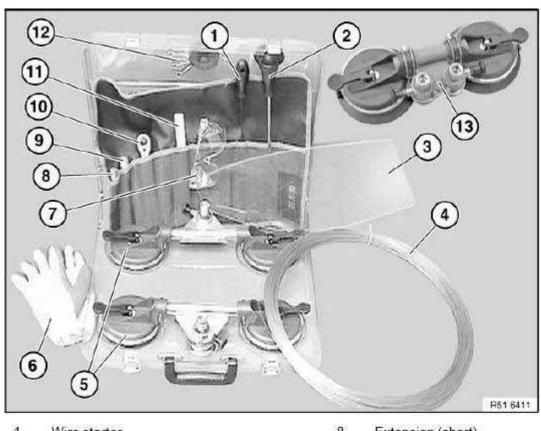
51 31 ... REMOVING WINDSCREEN WITH "ROLL OUT 2000"

Special tools required:

• 51 3 270

Windscreen removal system "Roll Out 2000"

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- 1 Wire starter
- 2 Parabolic tool
- 3 Plastic washer
- 4 Wire cutting roller
- 5 Windlasses
- 6 Protective gloves
- 7 Protective goggles

- 8 Extension (short)
- 9 Extension (long)
- 10 Reversible ratchet
- 11 Plastic wedge
- 12 Guide needles
- 13 Windlass with double coil

Fig. 152: Identifying Windscreen Removal System Components (Roll Out 2000) Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Using the "Roll Out 2000" system (sourcing reference: BMW Workshop Equipment and Planning Documentation) minimizes paintwork and ergonomic damage as well as damage that is hazardous to health.

WARNING: Follow safety instructions for working on cars with airbag systems (risk of injury).

IMPORTANT: Take care when handling sharp-edged tools and cutting wire (risk of damage to head airbag).

IMPORTANT: Always keep both suckers dry and clean to ensure their optimum adhesion on

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the windscreen.
Lubricate coil if interlock rattling becomes too loud.
Always wear protective goggles and gloves for your own safety.

Preparatory work:

- o To avoid paintwork damage, tape off working area over large area at outlet of wire starter (2) with fabric adhesive tape (1)
- o Cut off required length (A) from cutting wire
 - (A) = Window diagonal x 4
- Check whether wire can get caught on rivets or retainers; if necessary, insert guide needles in bonding joint and guide cutting wire past

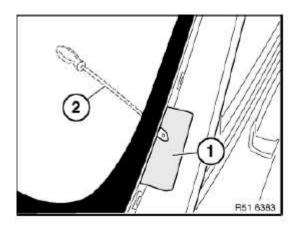


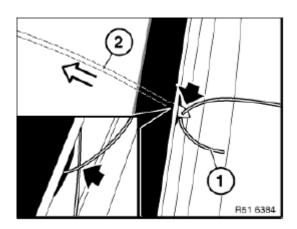
Fig. 153: Identifying Wire Starter And Fabric Adhesive Tape Courtesy of BMW OF NORTH AMERICA, INC.

Pulling cutting wire into car:

- o Push wire starter (2) from inside at a suitable point through adhesive bead
- o Feed wire end (1) into hole of wire starter (2) and bend back
- o Pull in both wires in succession crossways

NOTE: Crossing the wires cuts through the adhesive bead completely.

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<u>Fig. 154: Pushing Wire Starter</u> Courtesy of BMW OF NORTH AMERICA, INC.

Laying cutting wire around windscreen:

- o Starting from pull-in point, lay wire eyelet created on the outside counterclockwise around the windscreen
- Pull excess wire into car interior

IMPORTANT: Make sure the cutting wire is located at all four corner points below the windscreen.

Check that the cutting wire is not caught on retainers or body. Secure window on outside with adhesive tape against slipping

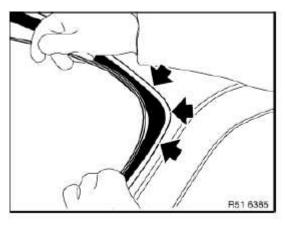


Fig. 155: Laying Cutting Wire Around Windscreen Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Windows (1) with fitted seals (3) or sprayed-on surrounds:

- o Moisten cutting wire (4) and seals (3) on window (1) with water
- o Insert cutting wire (4) in bend (without kinking) between window (1) and

body cutout (2)

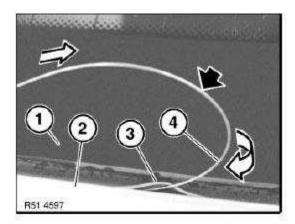
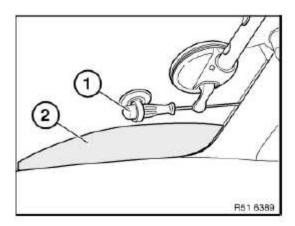


Fig. 156: Inserting Cutting Wire In Bend Between Window And Body Cutout
Courtesy of BMW OF NORTH AMERICA, INC.

Protecting car interior:

- To avoid damage and if necessary dirt, protect A-pillars, roof and instrument panel by means of parabolic tool (1) or plastic washer (2)
- o Move parabolic tool (1) during removal so that wire cannot get caught
- o Always guide plastic washer (2) between wire and panel



<u>Fig. 157: Identifying Parabolic Tool And Plastic Washer</u> Courtesy of BMW OF NORTH AMERICA, INC.

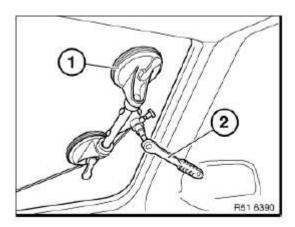
Starting removal:

- o Place windlass (1) on windscreen
- o Feed wire end into coil of windlass (1)

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NOTE: Coil can only be turned in one direction.

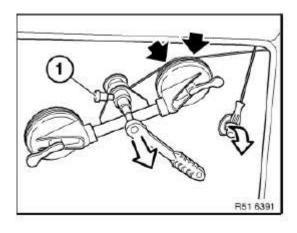
- o Make sure the wire is always situated in the guide channel of the windlass (1)
- o Fit reversible ratchet (2) on coil and tension wire
- o Start by cutting lower adhesive bead
- o Grip second wire end in special tool 51 3 270



<u>Fig. 158: Identifying Reversible Ratchet And Windlass</u> Courtesy of BMW OF NORTH AMERICA, INC.

Moving windlass:

- o Before moving windlass, remove reversible ratchet, extension and parabolic tool
- o Release sucker on windlass
- o Pull and hold black locking button (1)
- Turn windlass and move with sucker
- o Refit reversible ratchet, parabolic tool and if necessary extension
- When cutting the corner points, make sure the wire is situated in the guide channel of the windlass; this
 makes the cutting job easier

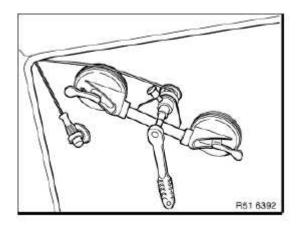


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Fig. 159: Identifying Black Locking Button Courtesy of BMW OF NORTH AMERICA, INC.

Installing second windlass:

- o Secure second windlass by suction on windscreen
- Feed second wire end into coil
- o Cut left side and top left corner point, as described above
- Finish removal
- o Remove "Roll Out 2000"



<u>Fig. 160: Identifying Second Windlass</u> Courtesy of BMW OF NORTH AMERICA, INC.

Windlass with double coil:

For use with small windows.

- o Attach windlass firmly to window so that both coils are turned away from application point of wire
- o Feed either the upper wire end into the lower coil or the lower wire end into the upper coil
- o Fit reversible ratchet on coil and tension wire
- o Cut through approx. 10 cm of bonding joint

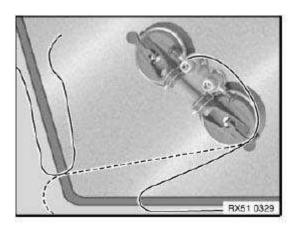
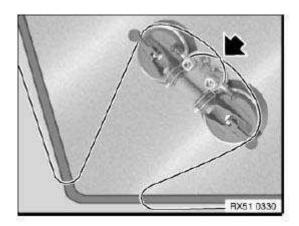


Fig. 161: Identifying Windlass With Double Coil Courtesy of BMW OF NORTH AMERICA, INC.

- o Feed other wire end into free coil so that the wires cross
- o Continue cutting bonding joint by alternately using the coils
- o Both wires meet ahead of both coils when removal is completed
- o Remove "Roll Out 2000"



<u>Fig. 162: Locating Wires</u> Courtesy of BMW OF NORTH AMERICA, INC.

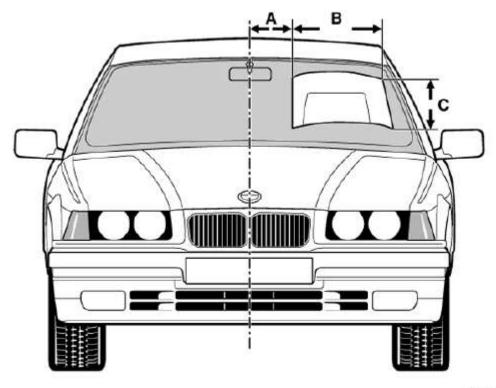
51 31 000 REMOVING AND INSTALLING / REPLACING WINDSCREEN

IMPORTANT: The "Instructions for window cementing" serve as the basis for these repair instructions and must be followed without fail.

51 31 015 REPAIRING DAMAGE TO WINDSCREENS CAUSED BY PITTING (STONE CHIPS) (CLEAR AND TINTED LAMINATED SAFETY GLASS)

Field of vision (no repairs acceptable):

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36 51 031

<u>Fig. 163: Identifying Field Of Vision</u> Courtesy of BMW OF NORTH AMERICA, INC.

- A. A 35 mm (gap between field of view / center of vehicle)
- B. B Up to end of wiper range, outside (field of view width)
- C. C Restriction by wiper range (height of field of view)

IMPORTANT: Repairs must only be carried out outside of the field of vision.

If the stone chip damage is outside the field of vision,

refer to 51 31 ...

51 31 021 REMOVING AND INSTALLING/REPLACING RUBBER FRAME FOR WINDSCREEN (TOP)

Necessary preliminary tasks:

- Remove cover for left A-pillar
- Remove left roof strip

NOTE: Both covers and roof strips must be removed in order to remove the windscreen.

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IMPORTANT: Rubber frame (1) features an aluminum section inlay (2).

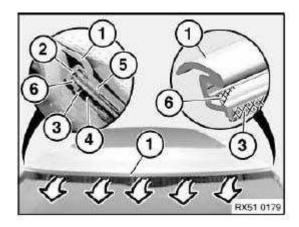
Carefully unwind rubber frame (1) (windscreen breakage).

Do not use crowbar (windscreen breakage)

NOTE: Tear-off lip (3) may be stuck to adhesive (4).

During removal of rubber frame (1), tear-off lip (3) may tear off and remain in vehicle.

- 5 Windscreen
- 6 Gripping lip



<u>Fig. 164: Removing Rubber Frame</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement of rubber frame without windscreen removal:

Detach tear-off lip (3) from rubber frame (1).

If adhesive leaks over tear-off lip (3), this area must be cut out partially.

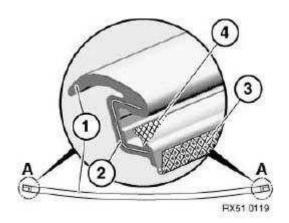
Cut (4) as illustrated in area (A) on left/right.

To facilitate installation, coat rubber frame (1) and body cutout with water.

Install rubber frame (1).

2 Aluminum strip

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<u>Fig. 165: Identifying Rubber Frame And Aluminum Strip</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement of rubber frame with removed windscreen:

Fit rubber frame (1) with tear-off lip (3).

Do not cut gripping lip (4).

Slide new rubber frame (1) onto upper edge of windscreen, ensuring correct alignment.

2 Aluminum strip

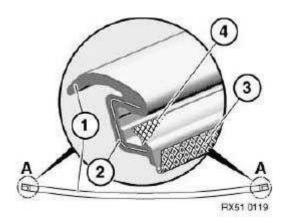


Fig. 166: Identifying Rubber Frame And Aluminum Strip Courtesy of BMW OF NORTH AMERICA, INC.

51 31 045 REMOVING AND INSTALLING/REPLACING TRIM ON A-PILLAR, LEFT OR RIGHT

Lever out trim strip (1) towards top.

Installation:

Make sure trim (2) is correctly seated on cowl panel cover (3).

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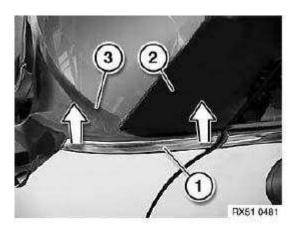


Fig. 167: Removing Trim Strip Courtesy of BMW OF NORTH AMERICA, INC.

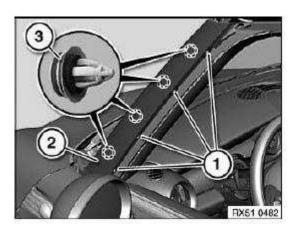
Release door seal in A-pillar area.

Release screws (1).

Release trim (2) at clips (3) and remove.

Installation:

If necessary, replace faulty clips (3).



<u>Fig. 168: Identifying Trim And Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, release clips (2) from A-pillar (1).

Seal (3) must not be damaged.

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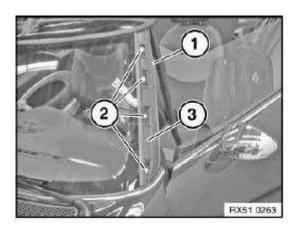
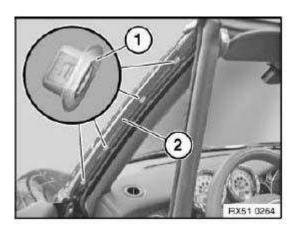


Fig. 169: Identifying Clips, A-Pillar And Seal Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace faulty nut inserts (1) on A-pillar (2).



<u>Fig. 170: Identifying Nut Inserts On A-Pillar</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 31 200 REMOVING AND INSTALLING/REPLACING REAR WINDOW

IMPORTANT: The "Instructions for window cementing" serve as the basis for these repair instructions and must be followed without fail.

51 31 284 REMOVING AND INSTALLING/REPLACING LOWER COVER ON REAR WINDOW

Unclip trim strip (1) first at top (A) then at bottom (B) from retaining strip (2).

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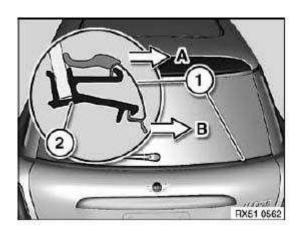


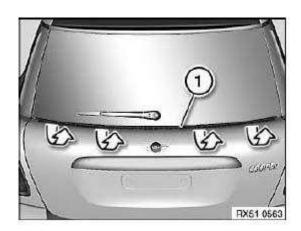
Fig. 171: Uncliping Trim Strip From Retaining Strip Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining strip (1) must not be damaged.

If necessary, remove and replace retaining strip (1).

To facilitate installation, moisten retaining strip (1) with water.



<u>Fig. 172: Removing Retaining Strip</u> Courtesy of BMW OF NORTH AMERICA, INC.

32 FRONT MANUALLY OPERATED

51 32 154 ADJUSTING LEFT OR RIGHT FRONT DOOR WINDOW GLASS

Special tools required:

- 51 3 010
- 51 3 080

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• 51 3 240

Requirements for correct adjustments:

- Front door correctly adjusted
- Car must stand on its wheels

Ideal adjustment, pretension:

Close door window completely.

Close front door until door lock is held in first door catch (1).

In this position the top edge of door window (2) must touch door seal (3) when it is subjected to load with light finger pressure.

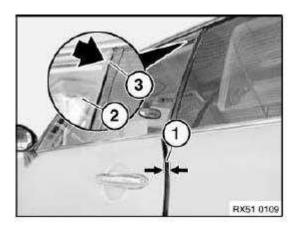


Fig. 173: Identifying Door Window And Door Seal Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting pretension:

Lever out caps (1).

Slacken screws (2)

Adjust pretension by moving power window rail (3).

Check adjustment, repeat procedure if necessary.

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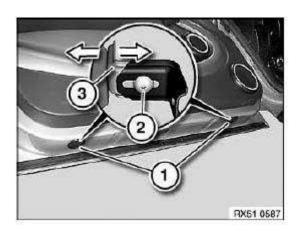


Fig. 174: Moving Power Window Rail Courtesy of BMW OF NORTH AMERICA, INC.

Ideal adjustment, retraction depth:

Open door, attach special tools 51 3 080 to door window and close door.

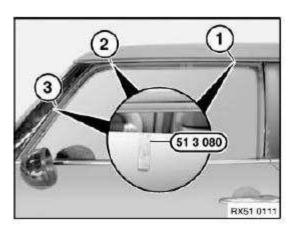
Measure penetration depth at positions (1 to 3).

Dimensions:

 $1 = 5 \pm 1 \text{ mm}$

 $2 = 5 \pm 1 \text{ mm}$

 $3 = 4.5 \pm 1 \text{ mm}$



<u>Fig. 175: Identifying Special Tools 51 3 080</u> Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting retraction depth:

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Remove outer window cavity cover strip

IMPORTANT: Tape off door in working area of special tool 51 3 240.

Fit special tool 51 3 240 between supports (1) and place on nut (2) in between.

Supports (1) must be slightly spread so that special tool 51 3 240 can be fitted correctly.

Slacken off nut (2) with special tool 51 3 240 until door window can be moved.

Attach special tool 51 3 010 and adjust door window.

Check adjustment, repeat procedure if necessary.

Tightening torque. Refer to BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK.

Initialize power window.

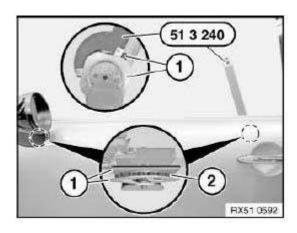


Fig. 176: Identifying Special Tool 51 3 240 And Supports Courtesy of BMW OF NORTH AMERICA, INC.

51 32 170 REMOVING AND INSTALLING FRONT LEFT OR RIGHT DOOR WINDOW GLASS

Necessary preliminary tasks:

- Remove window cavity cover strip
- Remove door trim panel

Open door window glass (1) down to distance (A)

Measurement (A):

A= approx. 75 mm

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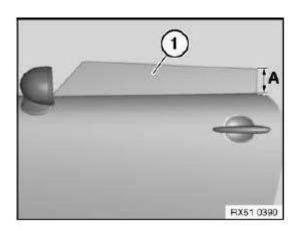


Fig. 177: Identifying Door Window Glass Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect battery.

Lever out caps (1).

Slacken screws (2) underneath until door window glass (3) can be fed out of power window unit.

Release door window glass (3) from power window unit and feed out in upward direction.

Installation:

Adjust door window glass.

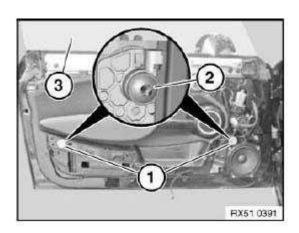


Fig. 178: Identifying Caps And Door Window Glass Courtesy of BMW OF NORTH AMERICA, INC.

33 FRONT ELECTRICALLY OPERATED

51 33 000 REMOVING AND INSTALLING (REPLACING) POWER WINDOW UNIT IN LEFT OR RIGHT FRONT DOOR

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Necessary preliminary tasks:

- Remove flat motor for power window
- Remove door trim panel carrier

Press down out catches (1) and feed out power window unit (2) from carrier (3).

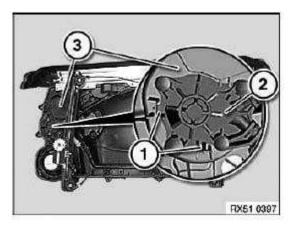


Fig. 179: Identifying Catches, Power Window Unit And Carrier Courtesy of BMW OF NORTH AMERICA, INC.

Release Bowden cable (1) from carrier.

Unfasten screws (2).

Feed out power window unit (5) with retaining plate (3) and bracket (4) in direction of arrow from carrier.

Installation:

Bracket (4) must be correctly seated in carrier.

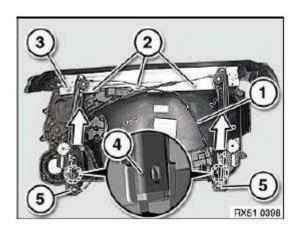


Fig. 180: Removing Power Window Unit With Retaining Plate And Bracket From Carrier Courtesy of BMW OF NORTH AMERICA, INC.

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Replacement:

Pull window cavity cover strip (1) off retaining plate (2).

Installation:

Coat window cavity cover strip (1) with water before fitting.

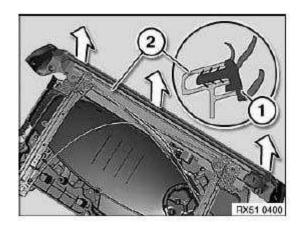


Fig. 181: Pulling Window Cavity Cover Strip Off Retaining Plate Courtesy of BMW OF NORTH AMERICA, INC.

36 HINGED WINDOW

51 36 040 REMOVING AND INSTALLING/REPLACING STRIP ON REAR LEFT OR RIGHT SIDE WINDOW

Starting at front, unclip strip (1) first at top (A) then at bottom (B) from retaining strip (2).

Installation:

Retaining strip (2) must not be damaged.

Start assembly at rear.

Clip in first at bottom (B) then at top (A).

Make sure strip (1) is correctly seated in area of door and rear lid.

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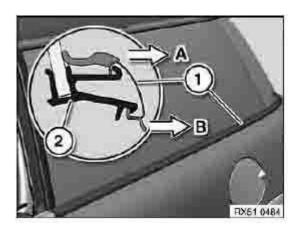


Fig. 182: Uncliping Strip From Retaining Strip Courtesy of BMW OF NORTH AMERICA, INC.

51 36 060 REPLACING B-PILLAR TRIM ON REAR LEFT OR RIGHT SIDE WINDOW

IMPORTANT: The Instructions on component cementing with double - sided adhesive tape serve as the basis for this repair instruction and must be observed without fail.

Remove and discard trim (1).

Installation:

Clean side window.

Stick on trim (1) in accordance with dimension (A) to door window glass (2).

 $A=6\pm 1 \text{ mm}$

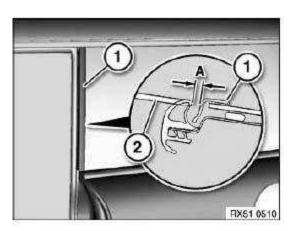


Fig. 183: Identifying Trim And Door Window Glass Courtesy of BMW OF NORTH AMERICA, INC.

51 36 070 REMOVING AND INSTALLING / REPLACING LEFT OR RIGHT REAR SIDE WINDOW

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IMPORTANT: The "Window cementing instructions" serve as the basis for this repair instruction and must be observed without fail.

41 FRONT DOOR TRIM PANEL

51 41 ... REPLACING SPEAKER TRIM ON LEFT OR RIGHT DOOR TRIM PANEL (MID-RANGE SPEAKER)

Necessary preliminary tasks:

• Remove switch for door mirror

Release speaker trim (1) at catches (2) and detach from door trim panel.

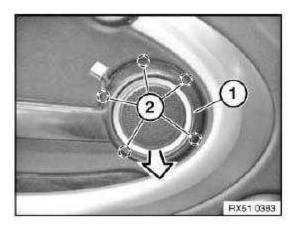


Fig. 184: Detaching Speaker Trim From Door Trim Panel Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) and foam material (2) on speaker trim (3) must not be damaged.

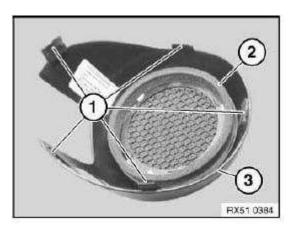


Fig. 185: Identifying Catches And Foam Material On Speaker Trim

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Courtesy of BMW OF NORTH AMERICA, INC.

51 41 000 REMOVING AND INSTALLING LEFT OR RIGHT FRONT DOOR TRIM PANEL

Special tools required:

• 00 9 317

Necessary preliminary tasks:

• Remove footwell light

Pull out pin (1).

Do not unclip trim cover (2). Trim cover (2) is detached when unclipping the door trim panel from door opener (3).

Installation:

Trim (2) can only be fitted in one position on door opener (3).

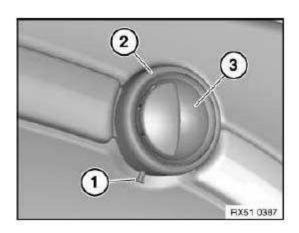


Fig. 186: Identifying Pin, Trim Cover And Door Opener Courtesy of BMW OF NORTH AMERICA, INC.

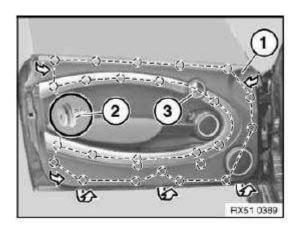
Release door trim panel (1) with special tool 00 9 317 from clips (2).

Trim cover (3) is unclipped when detaching door trim panel (1).

Installation:

If necessary, replace faulty clips (2).

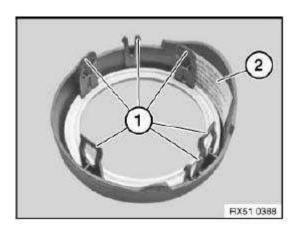
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<u>Fig. 187: Identifying Door Trim Panel, Trim Cover And Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) on trim (2) must not be damaged.



<u>Fig. 188: Identifying Catches On Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure all clips are in correct installation position on door trim panel (2).

Clips (1) are white, the other clips are grey.

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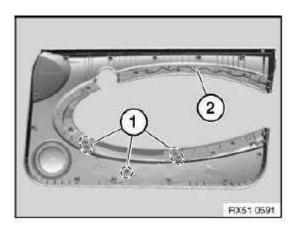


Fig. 189: Identifying Door Trim Panel And Clips Courtesy of BMW OF NORTH AMERICA, INC.

51 41 005 REMOVING AND INSTALLING LEFT OR RIGHT DOOR TRIM PANEL CARRIER

Necessary preliminary tasks:

- Remove door window glass
- Remove armrest

Disconnect plug connection (1).

Installation:

Check function.

If necessary, initialize power window unit.

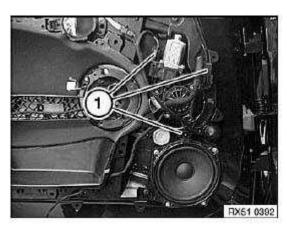


Fig. 190: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Feed out window cavity seal at front (1) and rear (2) from door.

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Release screws (3) and remove bracket (4).

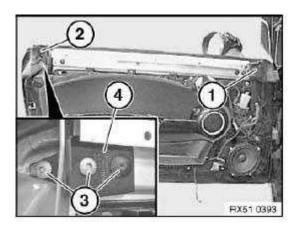


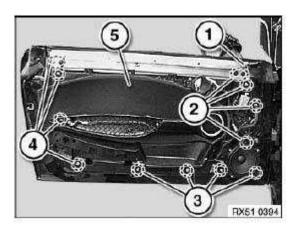
Fig. 191: Identifying Bracket And Window Cavity Seal Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove retaining plate underneath.

Release screws (2, 3 and 4).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Release carrier (5) from door and pull upwards slightly.



<u>Fig. 192: Identifying Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unclip Bowden cable holder (1) in direction of arrow.

Installation:

Make sure Bowden cable (2) is correctly seated on holder (1).

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Make sure Bowden cable is correctly positioned on door trim panel carrier.

Feed out complete door trim panel from door.

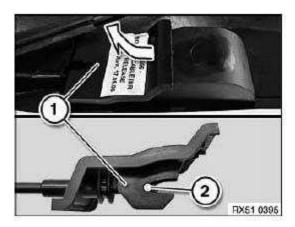


Fig. 193: Uncliping Bowden Cable Holder Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All-round door seal (1) must not be damaged.

US national variant only:

Crash pad (2) must be fitted.

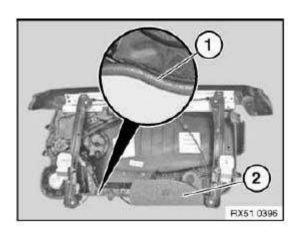


Fig. 194: Identifying Door Seal And Crash Pad Courtesy of BMW OF NORTH AMERICA, INC.

51 41 005 REPLACING LEFT OR RIGHT DOOR TRIM PANEL CARRIER

Necessary preliminary tasks:

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- Remove power window unit
- Remove door handle
- Remove inside door opener
- Remove speaker
- Remove wiring harness

51 41 017 REMOVING AND INSTALLING/REPLACING COVER ON DOOR HANDLE, FRONT LEFT OR RIGHT

Necessary preliminary tasks:

- Remove armrest
- Remove speaker trim

Release screws (1) and remove cover (2).

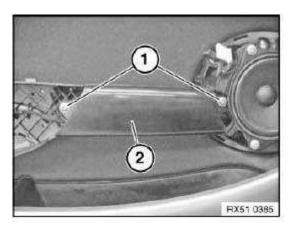


Fig. 195: Identifying Cover Courtesy of BMW OF NORTH AMERICA, INC.

51 41 018 REPLACING SPEAKER TRIM ON LEFT OR RIGHT DOOR TRIM PANEL (WOOFER)

Necessary preliminary tasks:

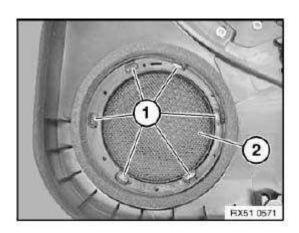
• Remove door trim panel

IMPORTANT: Do not drill out welding spots too large as openings are used as a guide.

Drill out welding spots (1) and remove speaker trim (2).

NOTE: Speaker trim is welded to door trim panel only on initial installation. If necessary, release screws instead of welding spots (1).

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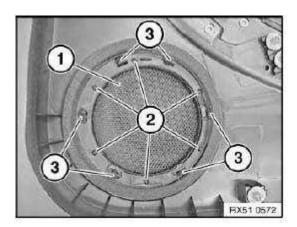
<u>Fig. 196: Identifying Speaker Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Speaker trim (1) can only be installed in one position.

Secure speaker trim (1) with repair screws (2).

Remove protruding guides (3).



<u>Fig. 197: Identifying Speaker Trim And Protruding Guides</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 41 019 REMOVING AND INSTALLING/REPLACING DOOR HANDLE ON DOOR TRIM PANEL, FRONT LEFT OR RIGHT

Necessary preliminary tasks:

- Remove cover on door handle
- Remove speaker

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If necessary, disconnect plug connection (1) and feed out cable.

Release screws (3).

Remove door handle (4).

If replacing version with light package:

Remove LED (2) for door trim panel light.

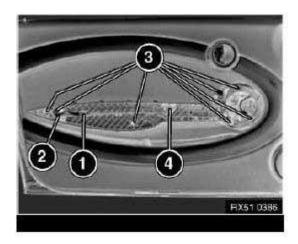


Fig. 198: Identifying Door Handle And Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

51 41 031 REPLACING DECORATIVE STRIP ON FRONT LEFT OR RIGHT DOOR TRIM PANEL

Necessary preliminary tasks:

• Remove door trim panel

Drill out welding spots (1) on door trim panel (2).

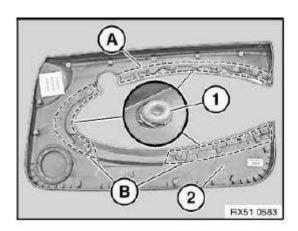
- A. Welding spots for decorative strip, top
- B. Welding spots for decorative strip, bottom

Unclip decorative strip.

NOTE: Only drill down to door trim panel area (2) so as not to damage the contact surface.

Remove all remnants of plastic from contact surface of door trim panel (2).

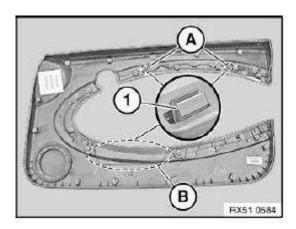
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<u>Fig. 199: Identifying Door Trim Panel</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Place decorative strip on door trim panel and clip into place in area (A) or (B) with catch (1).



<u>Fig. 200: Identifying Catch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Secure welding pins in area (1) or (2) with locking washers.

Shorten welding pins down to measurement (A).

A = 2 mm

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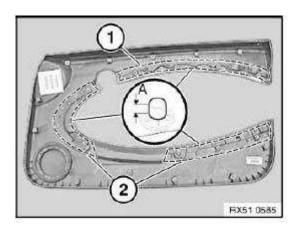


Fig. 201: Identifying Welding Pins Measurement Courtesy of BMW OF NORTH AMERICA, INC.

51 41 081 REPLACING ARMREST ON FRONT LEFT OR RIGHT DOOR TRIM PANEL

Lever armrest (1) at top and bottom in direction of arrow from door handle (2).

Installation:

Catches on door handle (2) must not be damaged.

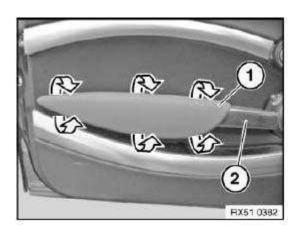


Fig. 202: Removing Armrest From Door Handle Courtesy of BMW OF NORTH AMERICA, INC.

43 SIDE COVERING WITH ARM

51 43 002 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SIDE TRIM PANEL

Necessary preliminary tasks:

Remove backrest for rear seat

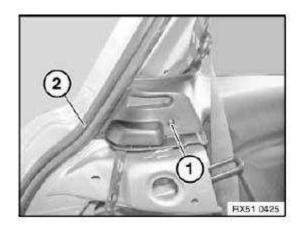
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- Remove rear seat
- Remove panel for door pillar (B-pillar)
- Remove panel for roof pillar at rear (C-pillar)
- Remove luggage compartment wheel arch trim

Release screw (1).

Installation:

Make sure mucket (2) is correctly seated.



<u>Fig. 203: Identifying Mucket</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Installation:

Make sure mucket (2) is correctly seated.

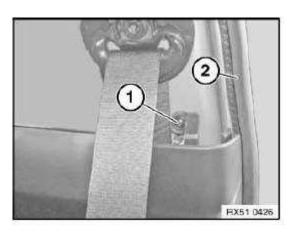


Fig. 204: Identifying Mucket

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Courtesy of BMW OF NORTH AMERICA, INC.

Detach side trim panel (1) from clips (2) towards inside.

Detach side trim panel (1) in upward direction from retainers (3).

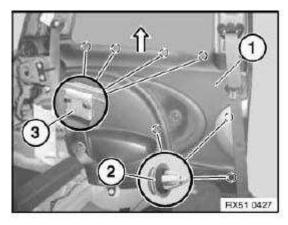
If necessary, disconnect plug connection for tweeter.

Feed out side trim panel (1).

Installation:

If necessary, replace faulty clips (2) and retainers (3).

First engage side trim panel (1) in retainers (3), then secure to clips (2).



<u>Fig. 205: Detaching Side Trim Panel From Retainers</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove tweeter

51 43 006 REPLACING DECORATIVE STRIP ON LEFT OR RIGHT SIDE TRIM PANEL

Necessary preliminary tasks:

• Remove side trim panel

Drill out welding spots (1) on side trim panel (2) and remove decorative strip.

NOTE: Only drill down to side trim panel area (2) so as not to damage the contact surface.

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Remove all remnants of plastic from contact surface of side trim panel (2).

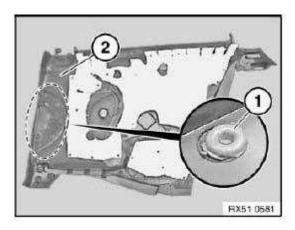


Fig. 206: Identifying Welding Spots On Side Trim Panel Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Place decorative strip on side trim panel.

Secure welding pins (2) with locking washers (1).

Shorten welding pins (1) down to measurement (A).

A = 2 mm

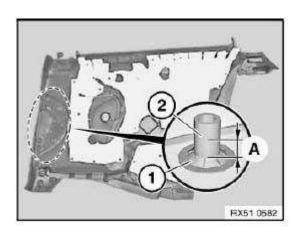


Fig. 207: Identifying Welding Pins Measurement Courtesy of BMW OF NORTH AMERICA, INC.

51 43 148 REMOVING AND INSTALLING OR REPLACING TRIM ON LEFT OR RIGHT DOOR PILLAR (TOP)

Lever out protective cap (1) and release screw underneath.

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Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Detach panel (2) from clip (5) towards inside.

Only if replacing, release belt strap (3) (see last work step).

Installation:

If necessary, replace faulty clip (5).

Make sure door seal (4) is correctly seated.

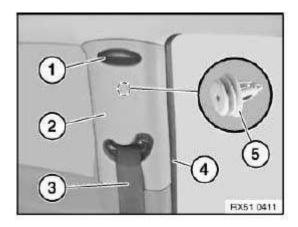


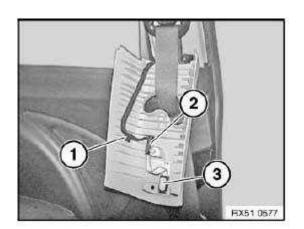
Fig. 208: Identifying Protective Cap, Panel, Door Seal And Clip Courtesy of BMW OF NORTH AMERICA, INC.

Version with light package:

Release cable holder (1) and disconnect plug connection (2).

Installation:

Make sure LED (3) is correctly seated.



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Fig. 209: Identifying Cable Holder And Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screw (1).

Tightening torque. Refer to BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK.

Feed out belt strap from trim for door pillar.

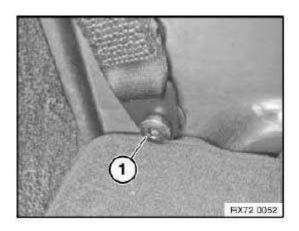


Fig. 210: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 201 REMOVING AND INSTALLING/REPLACING PANEL FOR ROOF PILLAR AT FRONT (A-PILLAR), LEFT OR RIGHT

WARNING: Vehicles with head airbags:

Read and comply with safety regulations for working on vehicles with airbag systems.

IMPORTANT: Do not use any sharp-edged tools to remove the trim (risk of damage to head airbag).

Lever out protective cap (1) and release screw underneath.

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Release panel (3) from clips (2) and remove towards inside.

Installation:

Make sure door seal (4) is correctly seated.

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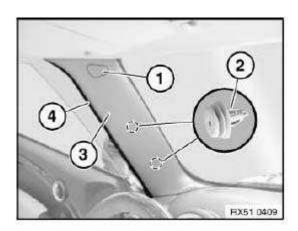


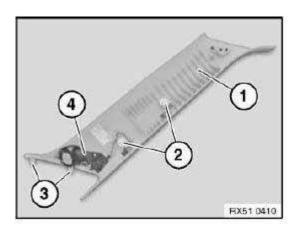
Fig. 211: Identifying Panel, Protective Cap, Clips And Door Seal Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clips (2) and guides (3) on panel (1) must not be damaged.

Replacement:

Modify tweeter (4).



<u>Fig. 212: Identifying Clips And Guides On Panel</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 43 251 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR LEFT OR RIGHT REAR ROOF PILLAR (C-PILLAR)

WARNING: Vehicles with head airbags:

Read and comply with safety regulations for working on vehicles with airbag systems.

IMPORTANT: Do not use any sharp-edged tools to remove the trim (risk of damage to head

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airbag).

Lever out cap (1) and release screw underneath.

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

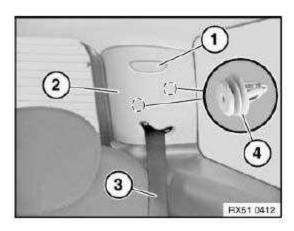
Detach panel (2) from clips (4) towards inside.

Only if replacing, release belt strap (3) (see last work step).

Installation:

If necessary, replace faulty clips (4).

Make sure seal for rear lid is correctly seated.



<u>Fig. 213: Identifying Cap, Panel, Belt Strap And Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Secure head airbag (1) to clip (2).

Place panel (3) with clips and guide (4) on roof pillar and clip into place.

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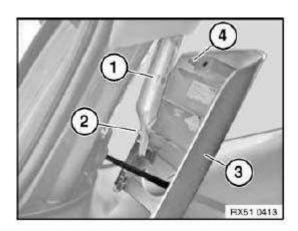


Fig. 214: Identifying Head Airbag, Clip, Panel And Guide Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove rear seat

Release screw.

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Feed out belt strap from trim panel for roof pillar.

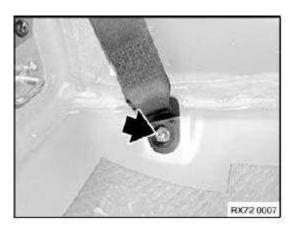


Fig. 215: Locating Screw
Courtesy of BMW OF NORTH AMERICA, INC.

44 ROOF TRIM PANEL

51 44 ... REMOVING AND INSTALLING/REPLACING TRIM FOR SLIDING SUNROOF ROLLER BLIND AT FRONT OR REAR

Open sun guard.

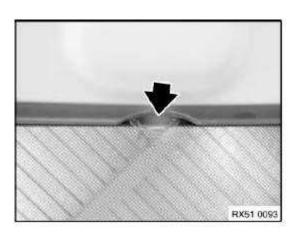


Fig. 216: Locating Sun Guard Courtesy of BMW OF NORTH AMERICA, INC.

Unclip trim all round from frame and remove.

Installation:

Make sure trim is correctly seated on roofliner and sliding sunroof frame.

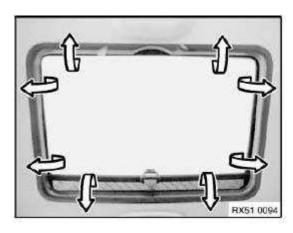


Fig. 217: Removing Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 44 001 REMOVING AND INSTALLING/REPLACING HEADLINER (WITHOUT SLIDE/TILT SUNROOF)

Except for the steps relating to the slide/tilt sunroof, the work is identical to: Removing and installing/replacing headliner (with slide/tilt sunroof)

51 44 011 REMOVING AND INSTALLING/REPLACING ROOFLINER (WITH SLIDE/TILT SUNROOF)

Necessary preliminary tasks:

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- Remove trim panel for roof pillar at front (A-pillar) left/right
- Remove all sun visors and counter-supports
- Remove roof operating unit
- Remove interior rear-view mirror
- Remove rain/light sensor cover
- Remove front roofliner trim
- Remove trim panels for door pillars
- Remove front/rear handles
- Remove ceiling light
- Remove rear roofliner trim
- Remove both backrests
- Remove trim panel for roof pillar at rear (C-pillar) left/right
- Remove luggage compartment wheel arch trim on driver's side
- Remove seal for rear lid

Slide driver's seat (1) fully forward and fold backrest back.

Slide passenger seat (2) fully forward (easy entry).

To prevent roofliner from tilting, tape off rear lid opening at top right and bottom left with yellow plastic adhesive tape (3).

NOTE: On right-hand drive cars, tape off areas at top left and bottom right.

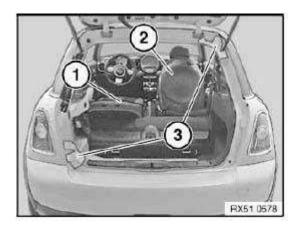


Fig. 218: Identifying Driver Seat And Passenger Seat Courtesy of BMW OF NORTH AMERICA, INC.

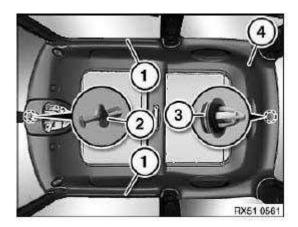
Detach mucket (1) at top.

Release expansion rivet (2).

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Detach roofliner (4) at clip (3).

Lay roofliner (4) downwards.



<u>Fig. 219: Identifying Mucket, Expansion Rivet, Roofliner And Clip</u> Courtesy of BMW OF NORTH AMERICA, INC.

Tilt roofliner (1) and feed out through rear lid opening.

NOTE: Roofliner must be bent slightly during removal.

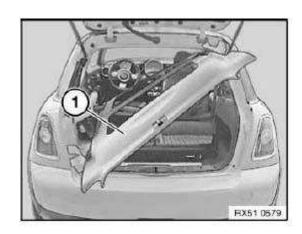
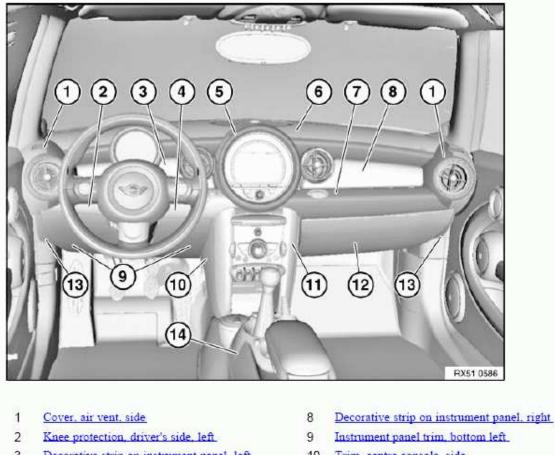


Fig. 220: Identifying Roofliner
Courtesy of BMW OF NORTH AMERICA, INC.

45 INSTRUMENT CLUSTER TRIM

51 45 .. OVERVIEW OF INSTRUMENT PANEL

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- 3 Decorative strip on instrument panel, left
- 4 Knee protection, driver's side, right
- 5 Cover, instruments
- Trim, instrument panel upper section
- Knee protection, passenger side Carrier for instrument panel

- 10 Trim, centre console, side
- Trim, centre console 11
- 12 Glovebox lid
- 13 Instrument panel lower section
- 14 Centre console
 - Function carrier on centre console

Fig. 221: Identifying Instrument Panel Components Courtesy of BMW OF NORTH AMERICA, INC.

51 45 ... REMOVING AND INSTALLING/REPLACING SIDE CENTRE CONSOLE PANEL

Special tools required:

• 00 9 317

Unclip side center console panel (1) with special tool 00 9 317 from retaining clips (2).

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<u>Fig. 222: Uncliping Side Centre Console Panel</u> Courtesy of BMW OF NORTH AMERICA, INC.

$51\ 45\dots$ REMOVING AND INSTALLING/REPLACING SIDE COVER FROM COVER FOR AIR OUTLET VENT

Special tools required:

• 00 9 340

Unclip cover (1) with special tool 00 9 340 in direction of arrow.

If necessary unfasten plug connection.

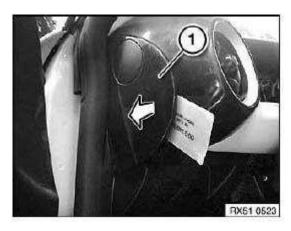


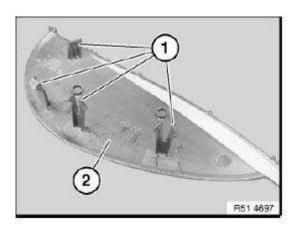
Fig. 223: Uncliping Cover Courtesy of BMW OF NORTH AMERICA, INC.

Retaining clips (1) of cover (2) must not be damaged.

Replacement:

If necessary, remove switch for passenger airbag deactivation.

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<u>Fig. 224: Identifying Clips Of Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 45 050 REMOVING AND INSTALLING/REPLACING INSTRUMENT PANEL UPPER SECTION TRIM

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove cover for instruments
- Remove cover for air outlet vent
- Remove solar sensor

Release screws (1).

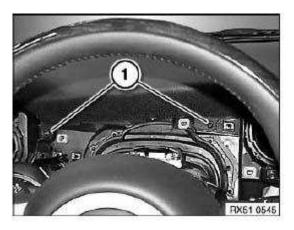
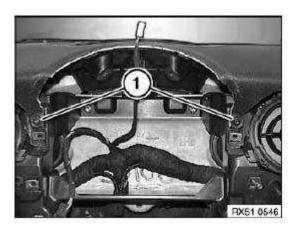


Fig. 225: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

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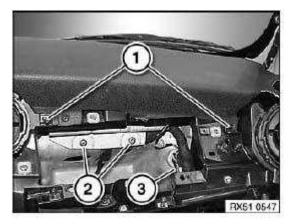
<u>Fig. 226: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unfasten screws (2).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Disconnect plug connection (3).



<u>Fig. 227: Identifying Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert centering pins of instrument panel upper section correctly into locators (1).

Connect cable for solar sensor with thread and pass through instrument panel opening.

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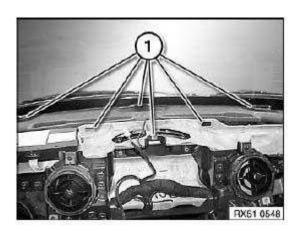


Fig. 228: Identifying Locators
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 070 REMOVING AND INSTALLING OR REPLACING INSTRUMENT PANEL LOWER SECTION

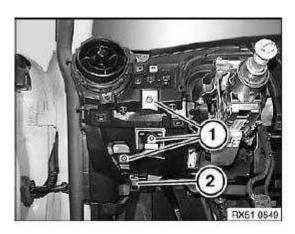
Necessary preliminary tasks:

- Move wheels into straight-ahead position
- Disconnect battery negative lead
- Remove complete instrument cluster
- Remove instrument panel top section trim
- Remove knee protection, driver's side, left
- Remove steering column switch cluster
- Remove footwell lights
- Remove glove compartment light
- If necessary, remove CD changer

Release screws (1).

Release plug for On-Board Diagnosis (2).

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<u>Fig. 229: Identifying Plug For On-Board Diagnosis</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

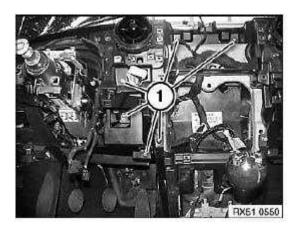
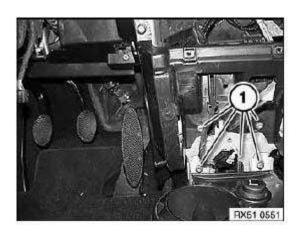


Fig. 230: Identifying Screws Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).



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Fig. 231: Identifying Screws Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove instrument panel lower section (2) towards rear.

Installation:

Make sure air ducts are correctly seated.

Replacement:

Remove vents (3).

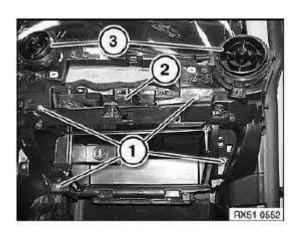


Fig. 232: Identifying Instrument Panel Lower Section And Vents Courtesy of BMW OF NORTH AMERICA, INC.

51 45 075 REMOVING AND INSTALLING CARRIER FOR INSTRUMENT PANEL

Necessary preliminary tasks:

- Remove instrument panel lower section
- Remove both front entrance covers
- Remove center console
- Remove control unit for Car Access System

Release screws (1) and lower steering column.

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Release screw (2).

Release screws (3).

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Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Unclip wiring harness (4).

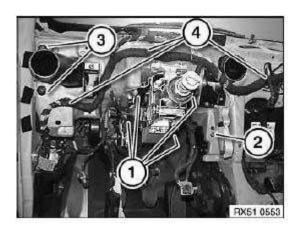


Fig. 233: Identifying Wiring Harness And Screws Courtesy of BMW OF NORTH AMERICA, INC.

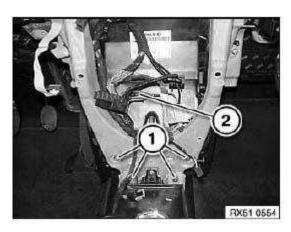
Release screws (1).

Disconnect plug connection (2).

If necessary, disconnect plug connection at handbrake switch.

If necessary, disconnect plug connection at airbag control unit.

If necessary, disconnect plug connection at eject box.



<u>Fig. 234: Identifying Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

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Unfasten screws (2).

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Unclip wiring harness (4).

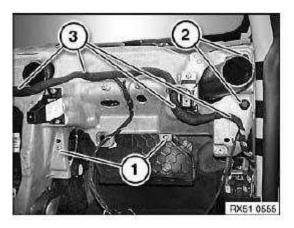


Fig. 235: Identifying Wiring Harness And Screws Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove carrier for instrument panel.

Installation:

Make sure air duct is correctly seated.

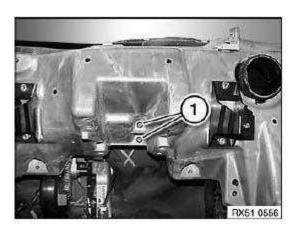


Fig. 236: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 076 REPLACING CARRIER FOR INSTRUMENT PANEL

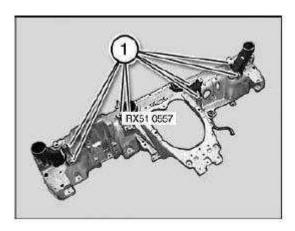
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Necessary preliminary tasks:

• Remove carrier for instrument panel

Release screws (1).

Remove holder for instrument panel lower section.



<u>Fig. 237: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Unclip air duct (2).

Disengage hose (3).

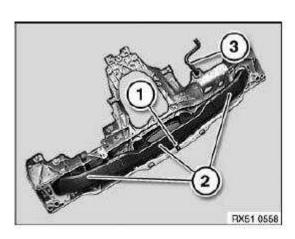


Fig. 238: Identifying Air Duct And Hose Courtesy of BMW OF NORTH AMERICA, INC.

51 45 108 REMOVING AND INSTALLING/REPLACING FUNCTION CARRIER ON CENTRE CONSOLE

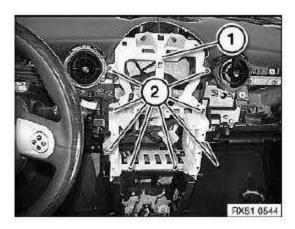
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Necessary preliminary tasks:

• Remove complete instrument cluster

Unfasten screws (2).

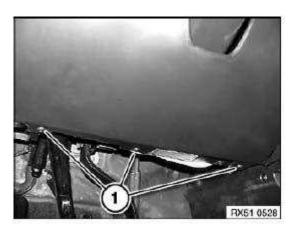
Remove function carrier (1).



<u>Fig. 239: Identifying Function Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 45 180 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT INSTRUMENT PANEL TRIM

Release screws (1).



<u>Fig. 240: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unclip bottom instrument panel trim (1) from retaining clips (2) and remove.

2007 ACCESSORIES AND BODY, CAB Body Equipment - Repair Instructions - Cooper

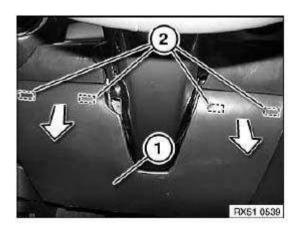


Fig. 241: Removing Bottom Instrument Panel Trim From Retaining Clips Courtesy of BMW OF NORTH AMERICA, INC.

51 45 250 REMOVING AND INSTALLING/REPLACING KNEE PROTECTION, DRIVER'S SIDE, LEFT

Necessary preliminary tasks:

- Remove trim for instrument panel at bottom left
- Remove air outlet vent at side left

Release screws (1).

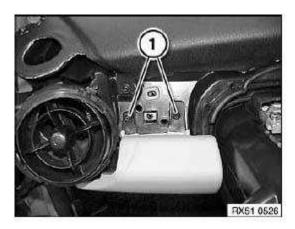


Fig. 242: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove knee protection (2).

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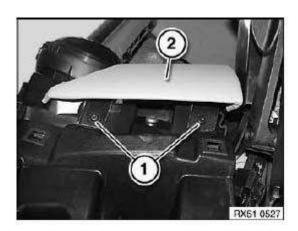


Fig. 243: Identifying Knee Protection Courtesy of BMW OF NORTH AMERICA, INC.

51 45 252 REMOVING AND INSTALLING/REPLACING KNEE PROTECTION, DRIVER'S SIDE, RIGHT

Necessary preliminary tasks:

- Remove trim for instrument panel at bottom left
- Remove cover for instruments

Release screws (1).



<u>Fig. 244: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove knee protection (2).

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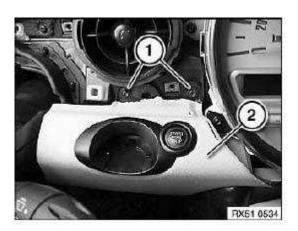


Fig. 245: Identifying Knee Protection Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Replacement:

Remove insert for radio control key.

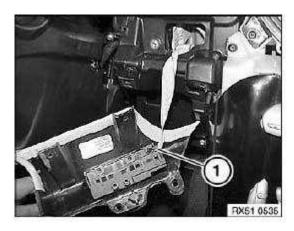


Fig. 246: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

51 45 254 REMOVING AND INSTALLING/REPLACING KNEE PROTECTION, PASSENGER'S SIDE

Necessary preliminary tasks:

- Remove cover for instruments
- Remove panel for roof pillar at front right
- Remove cover for air outlet vent on right

Open glovebox lid.

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Release screws (1).

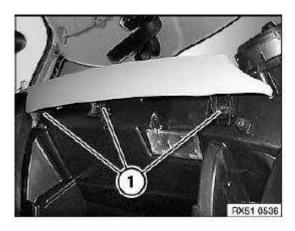
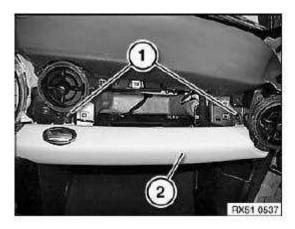


Fig. 247: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove knee protection (2).



<u>Fig. 248: Identifying Knee Protection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Unclip glovebox button (1).

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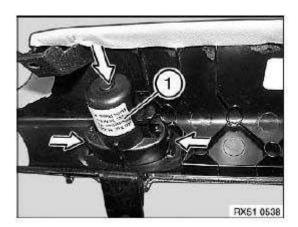


Fig. 249: Uncliping Glovebox Button Courtesy of BMW OF NORTH AMERICA, INC.

51 45 370 REMOVING AND INSTALLING (REPLACING) LEFT DECORATIVE STRIP ON INSTRUMENT PANEL

Special tools required:

• 00 9 317

Necessary preliminary tasks:

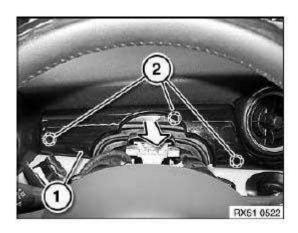
• Remove rev counter from steering column

Carefully unclip decorative strip (1) with special tool 00 9 317 at retaining points (2) and remove.

Installation:

Make sure pins are correctly seated on trim strip (1).

If necessary, replace defective clips.



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<u>Fig. 250: Identifying Decorative Strip</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 45 380 REMOVING AND INSTALLING (REPLACING) RIGHT DECORATIVE STRIP ON INSTRUMENT PANEL

Special tools required:

• 00 9 317

Carefully unclip decorative strip (1) with special tool 00 9 317 at retaining points (2) and remove.

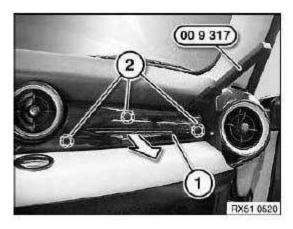


Fig. 251: Removing Decorative Strip Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure pins (1) are correctly seated on decorative strip.

If necessary, replace faulty retainers (2).

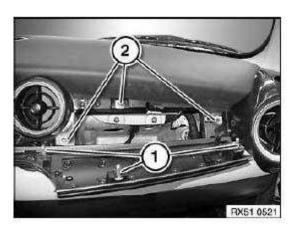


Fig. 252: Identifying Pins And Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

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51 45 430 REMOVING AND INSTALLING/REPLACING COVER FOR AIR OUTLET VENT ON LEFT (OR RIGHT)

Necessary preliminary tasks:

- Remove decorative strip on instrument panel
- Remove panel for roof pillar at front
- Remove side cover from cover for air outlet vent

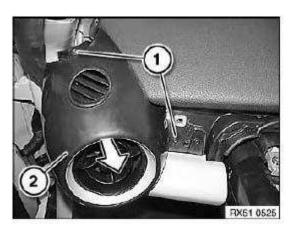
Release screws (1).



<u>Fig. 253: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove cover for air outlet vent (2) in direction of arrow.



<u>Fig. 254: Removing Cover For Air Outlet Vent</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 45 435 REMOVING AND INSTALLING/REPLACING COVER FOR INSTRUMENTS

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Necessary preliminary tasks:

- Remove decorative strip on instrument panel on left
- Remove decorative strip on instrument panel on right

Unclip covers for air outlet vent (1).



Fig. 255: Identifying Air Outlet Vent Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

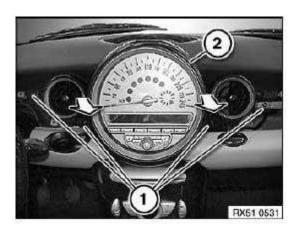


<u>Fig. 256: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove cover for instruments (2) in direction of arrow.

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<u>Fig. 257: Removing Cover For Instruments</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Replacement:

Remove switch for hazard warning flashers.



Fig. 258: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

46 PARCEL SHELF TRIM PANEL

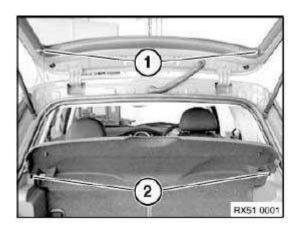
51 46 003 REMOVING AND INSTALLING/REPLACING TRIM FOR REAR PARCEL SHELF

Open rear lid.

Unfasten retaining straps (1) on left and right.

Pull rear parcel shelf out of guides (2).

2007 ACCESSORIES AND BODY, CAB Body Equipment - Repair Instructions - Cooper



<u>Fig. 259: Identifying Retaining Straps And Guides</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 46 050 REMOVING AND INSTALLING/REPLACING TOP TRIM ON REAR APRON

Open/take out luggage compartment floor trim panel.

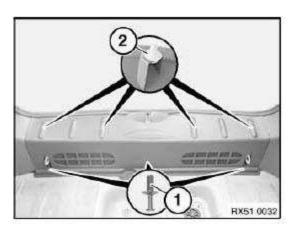
Release expansion rivets (1).

Release trim upwards from clips (2) and feed out.

Installation:

If necessary, replace faulty expansion rivets (1) and clips (2).

Make sure seal for rear lid is correctly seated.



<u>Fig. 260: Identifying Expansion Rivets And Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

47 FLOOR - LUGG. COMP. - ENG

2007 ACCESSORIES AND BODY, CAB Body Equipment - Repair Instructions - Cooper

51 47 ... REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT UNDERBODY PANELLING

NOTE: Work shown on R56 COOPER by way of example, deviations in detail are possible in other models.

Release plastic nuts (1, 2 and 3).

Release screw (4).

Release expander rivets (5) and remove underbody panelling.

Installation:

If necessary, replace defective retaining elements.

Make sure underbody panelling is correctly seated.

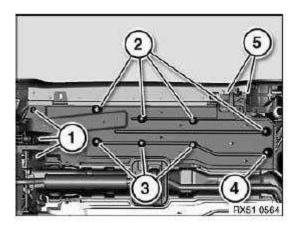


Fig. 261: Identifying Plastic Nuts And Expander Rivets Courtesy of BMW OF NORTH AMERICA, INC.

51 47 000 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT ENTRANCE COVER STRIP

Release screw (1).

Installation:

Replace screw (1).

Tightening torque. Refer to <u>RESTRAINTS - TIGHTENING TORQUES - 2007 HATCHBACK</u>.

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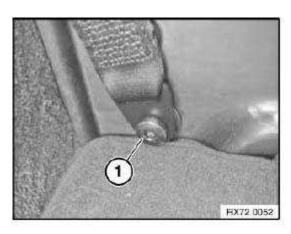


Fig. 262: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Move front seat forwards/up completely.

Remove bushing (1).

Release mucket (2).

Detach side trim panel (4) at clip (3).

Installation:

If necessary, replace faulty clip (3).

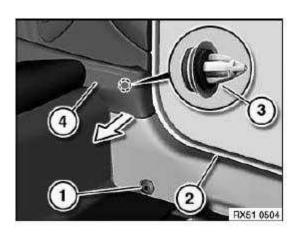


Fig. 263: Detaching Side Trim Panel Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Seat shown removed for purposes of clarity.

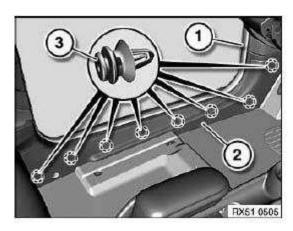
Before feeding out entrance cover strip, cover seat panel with cloth (risk of damage/scratching).

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Release mucket (1).

Detach entrance cover strip (2) from clips (3).

Bend entrance cover strip (2) slightly and carefully feed out.



<u>Fig. 264: Identifying Mucket, Entrance Cover Strip And Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Guides (1 and 2) must not be damaged.

If necessary, replace faulty clips (3).

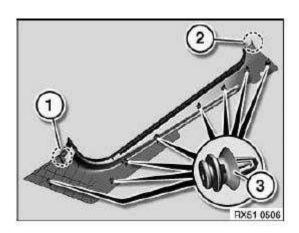
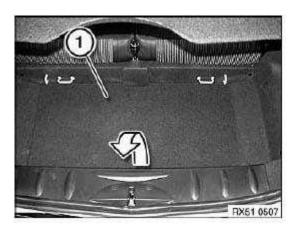


Fig. 265: Identifying Guides And Clips Courtesy of BMW OF NORTH AMERICA, INC.

51 47 101 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT FLOOR TRIM PANEL

Take out luggage compartment floor trim panel (1).

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<u>Fig. 266: Removing Luggage Compartment Floor Trim Panel</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 47 151 REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM

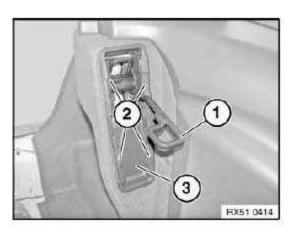
Necessary preliminary tasks:

- Remove trim on tail panel
- Remove luggage compartment light.

Version with storage pack:

Fold closing clip (1) upwards half-way.

Fold open retaining tabs (2) and feed out trim (3) towards inside.



<u>Fig. 267: Identifying Closing Clip, Retaining Tabs And Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release expansion rivets (1).

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Fold rear luggage compartment wheel arch trim (2) towards

inside and disconnect plug connection at power socket (4).

Feed out luggage compartment wheel arch trim (2).

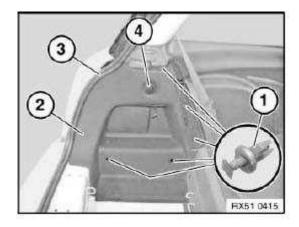
Installation:

If necessary, replace faulty expander rivets (1).

Make sure mucket (3) is correctly seated.

Replacement:

Modify power socket (4).



<u>Fig. 268: Identifying Luggage Compartment Wheel Arch Trim, Power Socket And Mucket Courtesy of BMW OF NORTH AMERICA, INC.</u>

51 47 161 REMOVING AND INSTALLING/REPLACING RIGHT LUGGAGE COMPARTMENT WHEEL ARCH TRIM

NOTE: Except for work relating to luggage compartment light, operation is identical to Removing and installing/replacing left luggage compartment wheel arch trim

51 47 314 REMOVING AND INSTALLING/REPLACING CARPET FOR PASSENGER COMPARTMENT

Necessary preliminary tasks:

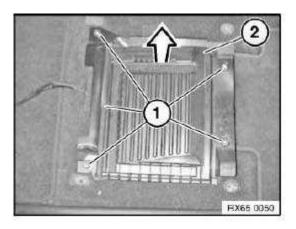
- Remove both front seats
- Remove airbag control unit
- Remove rear storage compartment holder

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- Remove both inner entrance cover strips
- Remove rear seat
- Remove lower trim from instrument panel
- Remove accelerator pedal module

Version with TV/telephone:

Release screws (1) and remove cover (2).



<u>Fig. 269: Removing Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

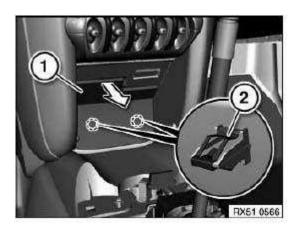
Release screws (1) and remove cover (2).



Fig. 270: Identifying Cover Courtesy of BMW OF NORTH AMERICA, INC.

Release trim (1) from retainers (2) and remove towards inside.

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<u>Fig. 271: Removing Trim From Retainers</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove trim (2).

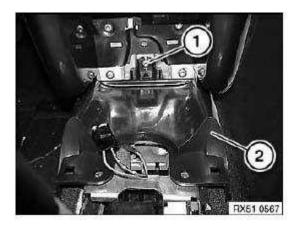


Fig. 272: Identifying Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).

Take off holder (3).

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<u>Fig. 273: Identifying Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove carpet (1) first at rear towards top.

Pull back carpet (1) at front under heater (2).

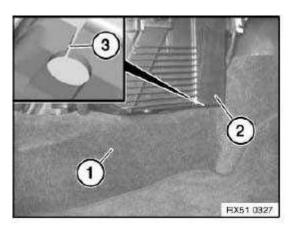
NOTE: A cut (3) is already provided in carpet (1).

Pay attention to cable when removing carpet (1).

If necessary, cut carpet (1) to feed out cable.

Installation:

Make sure openings for air duct and attachment points are correctly positioned.



<u>Fig. 274: Identifying Carpet And Heater</u> Courtesy of BMW OF NORTH AMERICA, INC.

49 REAR LID TRIM PANEL

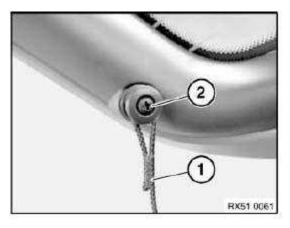
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51 49 003 REMOVING AND INSTALLING/REPLACING TRIM FOR REAR WINDOW FRAME ON LEFT OR RIGHT

Necessary preliminary tasks:

• Remove trim for rear lid at bottom

Detach retaining cord (1) for rear parcel shelf and release screw (2).



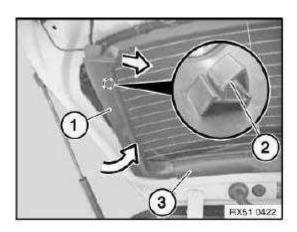
<u>Fig. 275: Identifying Retaining Cord</u> Courtesy of BMW OF NORTH AMERICA, INC.

Detach panel (1) at top from retainer (2) towards inside.

Feed out panel (1) at bottom from trim (3).

Installation:

Retainer (1) must not be damaged.



<u>Fig. 276: Detaching Panel From Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

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51 49 005 REMOVING AND INSTALLING/REPLACING TRIM FOR LOWER REAR LID

If necessary, remove warning triangle.

Release screws (1).

If necessary, remove warning triangle holder.

Detach trim panel (4) from clips (2 and 3) and remove.

Installation:

If necessary, replace faulty clips (2 and 3).

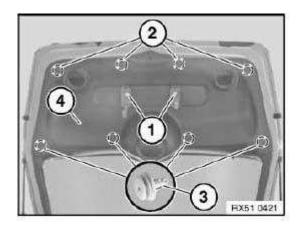


Fig. 277: Identifying Trim Panel And Clips Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove stops for rear parcel shelf.

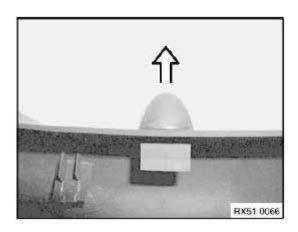


Fig. 278: Removing Stops For Rear Parcel Shelf

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Courtesy of BMW OF NORTH AMERICA, INC.

51 49 013 REMOVING AND INSTALLING/REPLACING TRIM FOR REAR WINDOW FRAME AT TOP

Special tools required:

• 00 9 317

Necessary preliminary tasks:

• Remove trim for rear window frame on left/right

Release trim (1) with special tool 00 9 317 from retainers (2).

Installation:

Clips (2) must not be damaged.

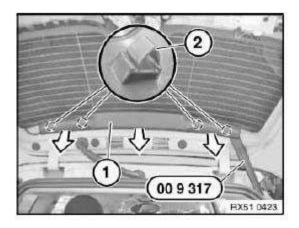


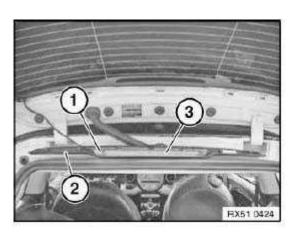
Fig. 279: Removing Trim From Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove trim (2).

Replacement:

Remove additional brake light (3).

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<u>Fig. 280: Identifying Plug Connection And Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

71 GASKETS-SEAL, LOOSE

51 71 ... REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PANELLING

Release screws (1).

Release nuts (2) and remove underbody panelling (3).

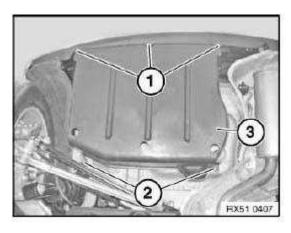


Fig. 281: Identifying Underbody Panelling Courtesy of BMW OF NORTH AMERICA, INC.

51 71 040 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER

Necessary preliminary tasks:

• Remove front wheel.

Release screw rivets (1 and 2).

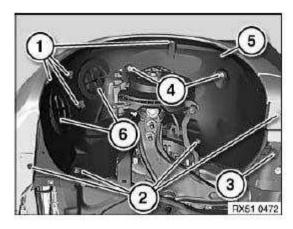
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Unscrew nut (3).

Release screws (4) and remove wheel arch cover (5).

Replacement:

If necessary, remove covers (6).



<u>Fig. 282: Identifying Wheel Arch Cover And Screw Rivets</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 71 041 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT WHEEL ARCH COVER

Necessary preliminary tasks:

• Remove rear wheel

Unscrew nuts (1).

Release screw rivets (2).

Release screw (3) and remove wheel arch cover (4).

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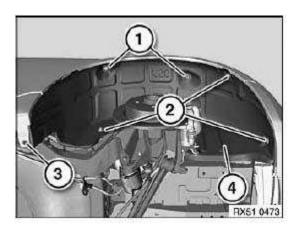


Fig. 283: Identifying Screw Rivets And Wheel Arch Cover Courtesy of BMW OF NORTH AMERICA, INC.

51 71 412 REMOVING AND INSTALLING/REPLACING REAR SPOILER

Special tools required:

• 51 0 300

Lever out seal plugs (1) and release nuts underneath.

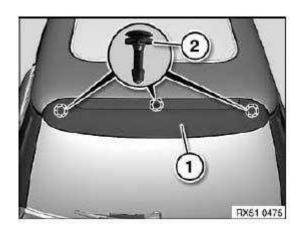
Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.



Fig. 284: Identifying Plugs Courtesy of BMW OF NORTH AMERICA, INC.

Detach rear spoiler (1) in upward direction from clips (2).

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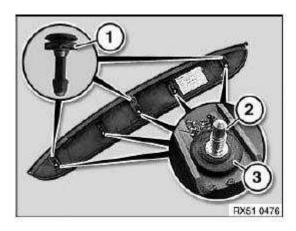


<u>Fig. 285: Identifying Rear Spoiler And Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace faulty clips (1).

Studs (2) and seals (3) must not be damaged.



<u>Fig. 286: Identifying Clips, Studs And Seals</u> Courtesy of BMW OF NORTH AMERICA, INC.

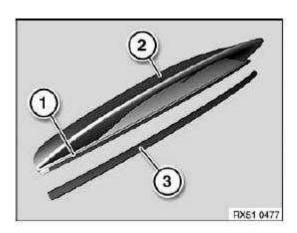
Replacement:

Clean adhesive area (1) on rear spoiler (2) with spirit.

Air drying time at least 1 minute.

Stick cover (3) to adhesive area (2) and press down with special tool 51 0 300 (hand roller).

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<u>Fig. 287: Identifying Rear Spoiler And Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 71 418 REPLACING TRIM ON PANEL FOR COVER ON LEFT OR RIGHT SIDE MEMBER

IMPORTANT: The Instructions on component cementing with double - sided adhesive tape serve as the basis for this repair instruction and must be observed without fail.

Remove and discard trim (1).

Installation:

Clean glue surface.

Stick on new trim (1).

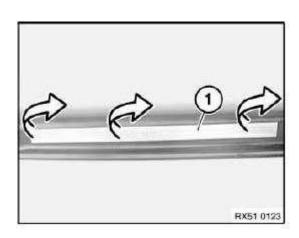


Fig. 288: Removing Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 447 REMOVING AND INSTALLING/REPLACING PANEL FOR COVER ON LEFT OR RIGHT SIDE MEMBER

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Necessary preliminary tasks:

• Remove trim on panel for cover on side member

Release clips (1).

Installation:

If necessary, replace faulty clips (1).

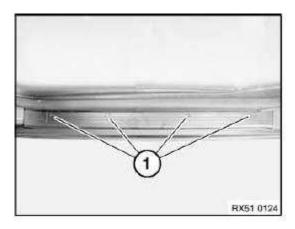


Fig. 289: Identifying Clips Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and screw rivets (2).

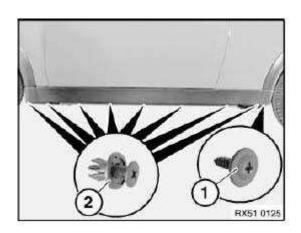
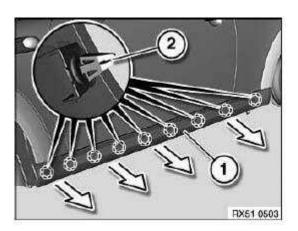


Fig. 290: Identifying Screw Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Release panel (1) at clips (2) and remove.

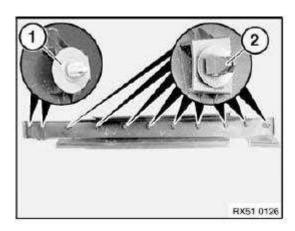
2007 ACCESSORIES AND BODY, CAB Body Equipment - Repair Instructions - Cooper



<u>Fig. 291: Removing Panel</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace faulty clips (1 and 2).



<u>Fig. 292: Identifying Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM

Special tools required:

- 00 2 261
- 00 2 262

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down.

Observe the following directions and instructions when handling the special tool:

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- 1. Prior to each use, check the special tools for defects, modifications and operational reliability.
- 2. Damaged/modified special tools must not be used!
- 3. No changes or modifications may be made to the special tools!
- 4. Keep special tools dry, clean and free of grease.
- 5. Impact screwdrivers may not be used!

IMPORTANT: Risk of corrosion!

Touch up paintwork damage. Re-establish wax layer.

Remove vehicle jack fixture with a suitable tool from side frame.

Installation:

Check fixture for damage, replace if necessary.

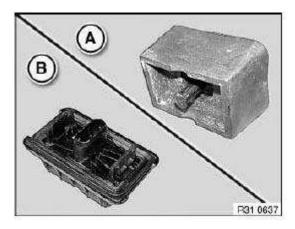


Fig. 293: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Following states can be selected on special tool 00 2 261.

- A. Vehicle unsecured
- B. Vehicle secured (after special tool is lashed to lifting platform arm)

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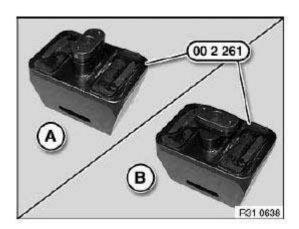


Fig. 294: Identifying Special Tool 00 2 261 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following procedure must always be carried out on the left and right sides.

Insert special tool 00 2 261 into opening in side frame with 3/8" extension and secure ratchet to body. To do so, turn lock through 90° up to stop.

WARNING: Danger to life!

Check stopping of special tool 00 2 261 on side frame, correct attachment if necessary.

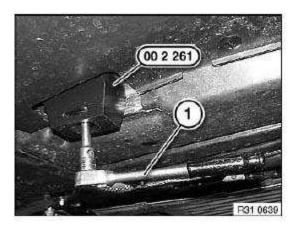


Fig. 295: Identifying Special Tool 00 2 261 Courtesy of BMW OF NORTH AMERICA, INC.

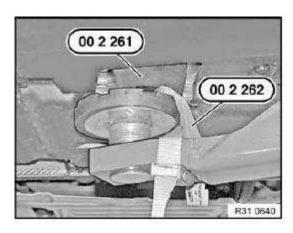
Lash special tool 00 2 261 with tensioning strap 00 2 262 crosswise (as pictured) to lifting platform arm.

WARNING: Danger to life!

Carry out tensile and visual inspection of tensioning strap 00 2 262,

correct position if necessary.

2007 ACCESSORIES AND BODY, CAB Body Equipment - Repair Instructions - Cooper



<u>Fig. 296: Identifying Special Tool 00 2 261 And 00 2 262</u> Courtesy of BMW OF NORTH AMERICA, INC.

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2007 BRAKES

Pedals - Repair Instructions - Cooper

11 PEDAL MOUNTING BLOCK

35 11 000 REMOVING AND INSTALLING COMPLETE BEARING BLOCK FOR FOOT PEDAL

Necessary preliminary tasks:

- Remove lower instrument panel trim, see <u>51 45 180 REMOVING AND INSTALLING/REPLACING</u> BOTTOM RIGHT INSTRUMENT PANEL TRIM
- Remove cover for cowl panel, see <u>51 13 123 REMOVING AND INSTALLING/REPLACING LEFT</u> COWL PANEL COVER on left

After completing work bleed clutch hydraulic system, see <u>21 00 006 BLEEDING CLUTCH HYDRAULIC</u> SYSTEM

Draw off brake fluid until level is below connection to clutch master cylinder.

Detach feed hose (2) for clutch hydraulics.

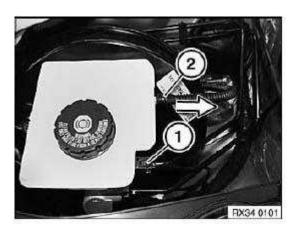


Fig. 1: Feed Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on clutch master cylinder.

Disconnect line connection (2).

IMPORTANT: Catch brake fluid in a suitable container.

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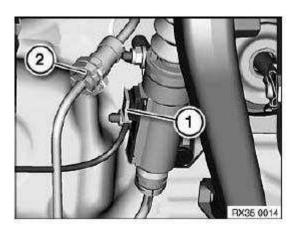


Fig. 2: Plug Connection And Line Connection Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Installation:

Tightening torque: 35 11 1AZ, see <u>35 11 PEDAL ASSEMBLY CONSOLE</u>

NOTE: Accessibility only with a 75 mm long extension (2).

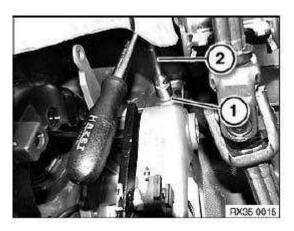


Fig. 3: Screw And Long Extension
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on brake light switch.

Detach retaining clip (2) and press out pin in direction of arrow.

Installation:

Check retaining clip (2) and replace if necessary.

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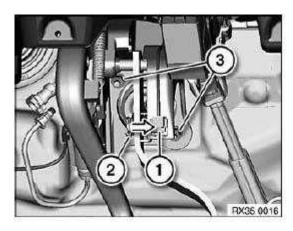
Make sure retaining clip (2) is correctly engaged.

Release nuts (3) and remove complete bearing block towards bottom.

Installation:

Replace self-locking nuts.

Tightening torque: 35 11 1AZ, see 35 11 PEDAL ASSEMBLY CONSOLE



<u>Fig. 4: Retaining Clip, Plug Connection And Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

When replacing bearing block:

Press pin (1) together and press out.

Release nuts (2) and remove clutch master cylinder.

Installation:

Replace self-locking nuts.

Tightening torque: 21 52 3AZ, see 21 52 CLUTCH CONTROL (HYDRAULIC)

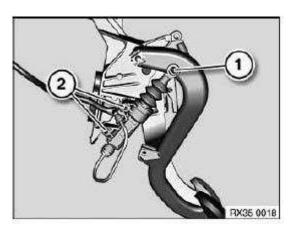


Fig. 5: Pin And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Detach locking clip (1).

Installation:

Check bearing bushings of clutch pedal and replace if necessary.

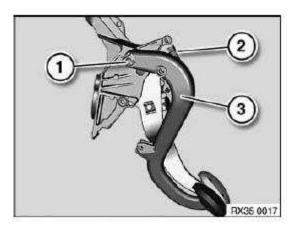
Lightly grease bearing bushings.

Check retaining clip (1) and replace if necessary.

Make sure retaining clip (1) is correctly engaged.

Disengage return spring (2) and remove clutch pedal (3).

Modify brake light switch.



<u>Fig. 6: Retaining Clip, Return Spring And Clutch Pedal</u> Courtesy of BMW OF NORTH AMERICA, INC.

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21 BRAKE PEDAL WITH LINKAGE

35 21 000 REMOVING AND INSTALLING/REPLACING BRAKE PEDAL

NOTE: The brake pedal cannot be individually replaced.

The procedure is described in Removing and installing bearing block, see 35 11

000 Removing and installing complete bearing block for foot pedal

31 CLUTCH PEDAL WITH LINKAGE

35 31 000 REMOVING AND INSTALLING/REPLACING CLUTCH PEDAL

Necessary preliminary tasks:

• Remove bearing block, see <u>35 11 000 Removing and installing complete bearing block for foot pedal</u>

Press pin (1) together and press out.

Detach locking clip (2).

Installation:

Check bearing bushings of clutch pedal and replace if necessary.

Lightly grease bearing bushings.

Check retaining clip (2) and replace if necessary.

Make sure retaining clip (2) is correctly engaged.

Disengage return spring (3) and remove clutch pedal.

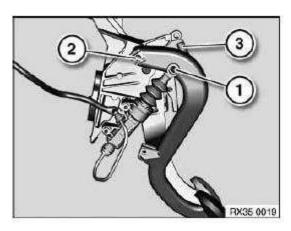


Fig. 7: Return Spring And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

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40 ACCELERATOR PEDAL ACTUATION

35 40 001 REMOVING AND INSTALLING/REPLACING ACCELERATOR PEDAL MODULE

When replacing control unit:

o Observe programming/coding

Take off cover (1).

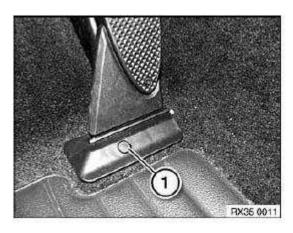


Fig. 8: Cover Courtesy of BMW OF NORTH AMERICA, INC.

Release socket head cap screw (1).

Installation:

Tightening torque: 35 40 1AZ, see 35 40 ACCELERATOR PEDAL ACTUATION

Feed out accelerator pedal module (2) towards top.

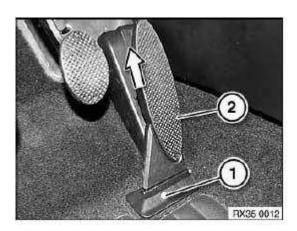


Fig. 9: Accelerator Pedal Module And Socket Head Cap Screw

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Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove accelerator pedal module.

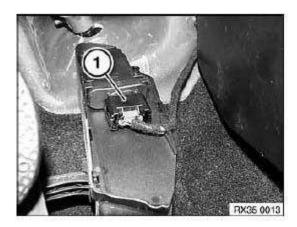


Fig. 10: Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

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2007 BRAKES

Brakes - Repair Instructions - Cooper

00 BRAKE TESTING AND BLEEDING

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

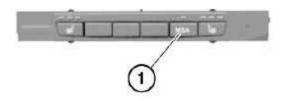
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 1: Identifying Button Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode A = 10 mm
 - Basic setting (engine hood/bonnet open) B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

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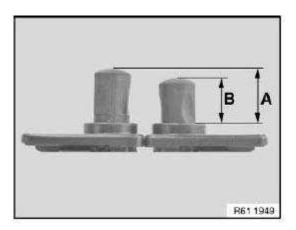


Fig. 2: Identifying Engine Hood Dimension Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

Observe instructions in diagnosis tool

34 00 ... GENERAL INFORMATION

The brake system is one of the most important safety systems on any motor vehicle. It is therefore essential to act with utmost care when working on the brake system and to follow the instructions below.

General:

- o Ensure cleanliness and only use rags which do not lose lint.
- Wash away or vacuum up brake dust, do not clear it away using compressed air. This dust is a health hazard.
- Ensure that no oils or grease enter the brake system: these substances would cause complete failure of the entire brake system.
- When cleaning brake components with brake cleaner, do not allow brake cleaner to get into the brake system.
- Even the most minute traces of brake cleaner must be avoided.

Brake fluid:

- o Replace brake fluid at least every two years.
- Never reuse drained brake fluid
- o Always use BMW-approved brake fluid.
- o Always dispose of brake fluid in approved receptacles.
- Do not allow brake fluid to drain into drain pipes, into the outside environment or into unsuitable facilities. This would create the risk of groundwater contamination since brake fluid is classed as a fluid that is hazardous to water.
- o Do not allow brake fluid to come into contact with paintwork as this will destroy the paint.

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- o Brake fluid must not be allowed to remain on bare skin too long in order to avoid skin problems. Wash skin coated with brake fluid with water and soap.
- o If brake fluid makes contact with eyes, immediately flush with large quantity of clean water and visit eye doctor.

Wheel brakes:

Brake pads:

Brake linings must be replaced when the warning threshold value of the brake lining wear indicator is reached

Refer to FRONT BRAKE R56 and REAR BRAKE DISCS R56.

Brake pads must always be replaced on both sides of any axle.

The friction surfaces of the brake linings must not come into contact with oils or greases. The brake pads must be replaced if they are fouled by such substances.

In the case of rotation-dependent brake pads, make sure the arrow marking points in the direction of rotation of the brake disk for when the vehicle is moving forward. Brake pads with left/right markings must be fitted on the relevant side of the vehicle.

One-sided angled areas on the brake pads must be located on the disk contact side of the brake calliper for when the vehicle is moving forward.

Brake discs:

Brake disks must not be scored or cracked. Furthermore, minimum brake disk thickness, disk runout, parallelism and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

Refer to **FRONT BRAKE R56** and **REAR BRAKE DISCS R56**.

Always strip preservative off new parts before installation. With the rear brake discs, also strip preservative off brake drum on parking brake.

Brake drums:

Brake drums must not be scored or cracked. Furthermore, the maximum drum inside diameter, radial runout and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

Always strip preservative off new parts before installation.

Brake callipers:

Only approved pastes on the basis of glycol must be used for repairs on brake callipers.

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All moving parts on the brake calliper must move freely: note grease specifications.

Use only BMW-approved lubricants to grease calliper guides.

Brake lines, brake hoses:

- o Brake lines and brake hoses must be correctly routed and must not abut with body or components in a way which would cause chafing.
- o To prevent damage, release and tighten brake line couplings with a special brake line wrench only.
- o The system must be bled each time any brake lines have been detached.
- All connection points must be checked for leaks.
- o Only tighten down brake hoses on the front axle when wheels are in straight-ahead position.
- Close open connections on brake lines and individual components to prevent dirt from entering the brake system.
- o Observe tightening torques when tightening down brake line screw connections.

Tightening torque: 34 32 1AZ . See **BRAKE LINES** for specs.

Wheel-slip control system:

The slip control system is basically maintenance-free.

However, be sure to adhere to the following:

- When carrying out welding work with electric welding equipment, be sure to disconnect the plug from the electronic control unit (ignition turned off).
- During painting work, the control unit may be subjected for brief periods to loads of max. 95°C and for long periods (approx. 2 hours) to loads of max. 85°C.
- o Tighten down the battery terminals completely.
- o The brake lines on the hydraulic unit must not be mixed up; if necessary, mark them before they are removed and after completing repairs perform the mix-up check with the DIS Tester.

34 00 ... GENERAL INFORMATION ON BREAKING IN NEW BRAKE DISCS / BRAKE PADS

IMPORTANT: After completing work:

- Carry out function check on brake analyzer (test stand) to ensure that the brakes complies with legal requirements.
- Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.
- Exaggerated drastic and continuous braking operations for faster braking in are not permitted.
- Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.

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Attach mirror tag to interior rearview mirror.

34 00 009 CHECKING BRAKES ON TEST STAND

Necessary preliminary tasks:

- Check tires for damage
- Check tire treads
- Check tire pressure

IMPORTANT: The corresponding system must be deactivated on vehicles equipped with ASC+T or DSC.

The ASC+T or DSC telltale and warning light must light up in the instrument cluster!

The brakes must be at normal operating temperature. To do so, gently warm up the brake disks and brake drums while dry by braking the vehicle several times.

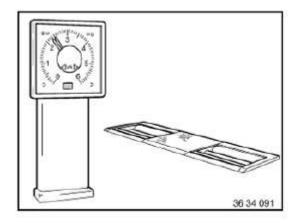


Fig. 3: Identifying Brake Test Stand
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only brake test stands (analyzers) with test speeds of < or = 5 km/h may be used.

You must follow without fail the guidelines contained in the operating instructions of the relevant test stand manufacturer.

Failure to do so may result in damage to the vehicle and the system and also personal injury.

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Special tools required:

• 34 1 260

NOTE: The thickness of the outer brake pads can be determined without removing the

road wheels.

If necessary, move car until inspection opening for brake pad wear indicator

(brake pad) can be seen through rim.

Insert special tool 34 1 260 through rim into recess for brake pad wear indicator.

Fit special tool on brake pad, slide ring (1) in direction of arrow towards well and read off measured value.

In this case, a brake pad thickness of 6 mm is measured.

NOTE: (A) Brake disk

(B) Brake lining

SAFE LIMIT FOR LINING WEAR ON FRONT BRAKE.

SAFE LIMIT FOR LINING WEAR ON REAR BRAKE.

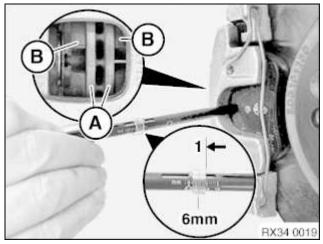


Fig. 4: Measuring Brake Pad Thickness Using Special Tool (34 1 260) Courtesy of BMW OF NORTH AMERICA, INC.

34 00 012 PARKING BRAKE FUNCTION CHECK

Perform inspection in the following manner:

When 1st ratchet is engaged, no braking force should be exerted.

The difference in wheel circumferential forces between the left and right wheels may deviate by max. 30 %

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from the greater value (measured on brake analyzer).

In event of larger deviations of wheel circumferential force: **READJUST HANDBRAKE**.

Braking with locked wheels must be possible with the handbrake.

The handbrake must be readjusted if the actuation stroke is greater than 6 teeth.

NOTE: The handbrake can only be adjusted correctly when the parking brake Bowden cables and all moving handbrake parts are free to move and fully operational.

Basic handbrake adjustment is necessary:

- In event of excessive actuation stroke (6 teeth).
- When replacing parking brake Bowden cables
- When replacing handbrake lever.

34 00 025 REPLACING FLUID IN ABS/ASC+T BRAKE SYSTEM

NOTE: Read and comply with <u>GENERAL INFORMATION</u>.

IMPORTANT: When carrying out repairs to the brake system, follow the procedure set out in BLEEDING BRAKE SYSTEM WITH DSC.

Open cover (1).

Connect bleeder unit to expansion tank (2) and switch on.

IMPORTANT: Check relevant Operating Instructions for each device.

Charging pressure should not exceed 2 bar.

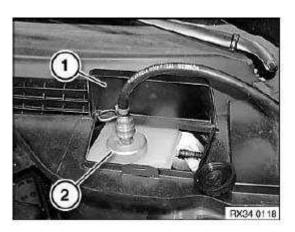


Fig. 5: Identifying Expansion Tank And Cover

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Courtesy of BMW OF NORTH AMERICA, INC.

Flushing brake system completely

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close bleed valve.

Follow same procedure on rear left, front right and front left wheel brake.

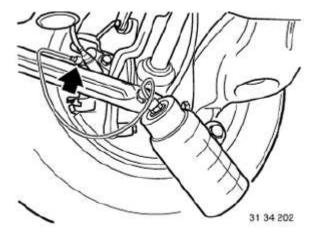


Fig. 6: Locating Bleeder Valve Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The <u>CLUTCH SLAVE CYLINDER</u> must be scavenged in cars with manual transmissions.

Switch off bleeder unit and remove from expansion tank.

Check brake fluid level.

Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

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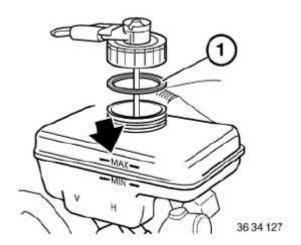


Fig. 7: Locating Rubber Seal
Courtesy of BMW OF NORTH AMERICA, INC.

34 00 048 BLEEDING BRAKE SYSTEM WITH ABS/ASC+T

NOTE: This procedure is described in the section headed <u>BLEEDING BRAKE SYSTEM</u> WITH DSC.

34 00 050 BLEEDING BRAKE SYSTEM WITH DSC

NOTE: Read and comply with <u>GENERAL INFORMATION</u>.

When replacing or repairing, observe the filling and bleeding instructions for the following parts:

- Tandem brake master cylinder
- Hydraulic unit
- o Components and connecting lines which are fitted between these assemblies.

Connect bleeder unit with max. 2 bar filling pressure.

A second person is needed to help carry out this work.

Open cover (1).

Connect bleeder unit to expansion tank (2) and switch on.

Connect DIS

Select path: Service functions - Chassis/Suspension - Slip control systems - Bleeding procedure.

IMPORTANT: Check relevant Operating Instructions for each device.

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Charging pressure should not exceed 2 bar.

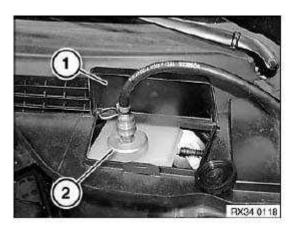


Fig. 8: Identifying Expansion Tank And Cover Courtesy of BMW OF NORTH AMERICA, INC.

Flushing brake system completely

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close bleed valve.

Follow same procedure on rear left, front right and front left wheel brake.

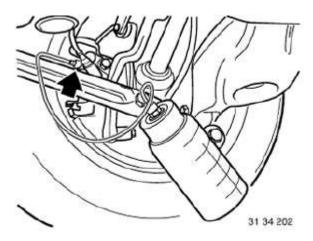


Fig. 9: Locating Bleeder Valve Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding rear-axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

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Close bleeder valve.

Run bleeding routine with DIS with bleeder valve open.

After completing routine, press brake pedal 5 times to floor; clear and bubble-free brake fluid must flow out.

Close bleed valve.

Repeat procedure at rear left.

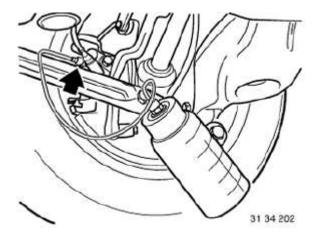


Fig. 10: Locating Bleeder Valve Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding front-axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on front right brake caliper.

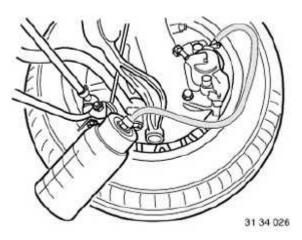
Close bleeder valve.

Run bleeding routine with DIS with bleeder valve open.

After completing routine, press brake pedal 5 times to floor, clear and bubble-free brake fluid must flow out.

Close bleed valve.

Repeat procedure at front left.



<u>Fig. 11: Connecting Bleeder Hose To Bleeder Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

Switch off bleeder unit and remove from expansion tank.

Check brake fluid level.

Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

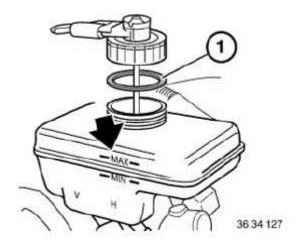


Fig. 12: Locating Rubber Seal Courtesy of BMW OF NORTH AMERICA, INC.

11 FRONT BRAKES

34 11 ... OVERVIEW OF FRONT BRAKES

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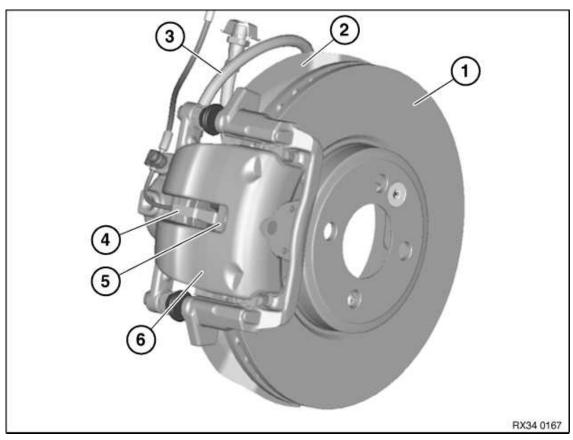


Fig. 13: Identifying Front Brake Components
Courtesy of BMW OF NORTH AMERICA, INC.

IDENTIFYING FRONT BRAKE COMPONENTS

IDENTIFICATION DEFINE CONTINUE TO THE TOTAL TO THE TOTAL TOT					
1	Brake disc	2	Brake guard plate		
3	Brake hose	4	Brake-pad wear sensor		
5	Brake pad	6	Brake calliper		

34 11 000 REMOVING AND INSTALLING/REPLACING BRAKE LININGS ON BOTH FRONT DISC BRAKES

Special tools required:

- <u>34 1 050</u>
- 34 1 280

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

Necessary preliminary tasks:

• Remove front WHEELS

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• Remove BRAKE PAD WEAR SENSOR

Pull brake pad wear sensor (1) towards front out of pad (left side only).

If necessary, replace brake pad wear sensor.

Release guide screw (2).

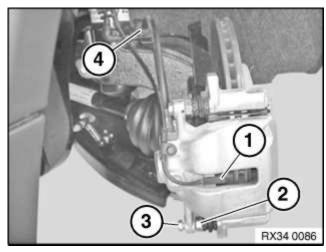
If necessary, grip at hexagon head (3).

Tilt brake calliper upwards.

Installation:

Replace guide screws.

Tightening torque: 34 11 3AZ . See **FRONT BRAKE R56** for specs.



<u>Fig. 14: Identifying Brake Pad Sensor, Guide Screw, Hexagon Head, And Brake Hose Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove brake pads (1) in direction of arrow from brake console.

IMPORTANT: Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Observe **MINIMUM THICKNESS OF BRAKE PADS**.

Clean brake pads.

Do not apply grease to brake pad backplate.

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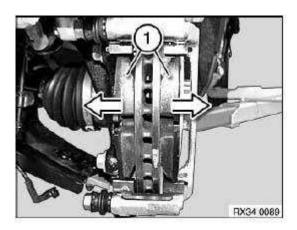


Fig. 15: Identifying Brake Pads Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- o Position special tool 34 1 280 at three measuring points in area (1) and measure.
- o Compare measurement result and lowest value with **SETPOINT VALUE**.

New brake pads may only be installed if the brake disc thickness is greater than or equal to the **MINIMUM BRAKE DISC THICKNESS (MIN TH)**.

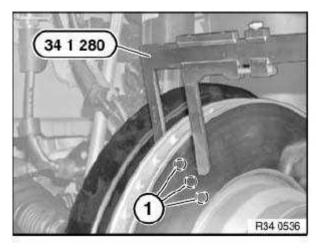


Fig. 16: Identifying Special Tool (34 1 280) Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

The minimum thickness of the brake disc is designed so that it holds over the service life of a further set of brake pads if it is greater than or equal to the MINIMUM BRAKE DISC THICKNESS (MIN TH).

Press brake piston fully back with special tool 34 1 050.

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IMPORTANT: When pressing piston back, note brake fluid level in expansion tank.

Overflowing brake fluid will damage the paintwork.

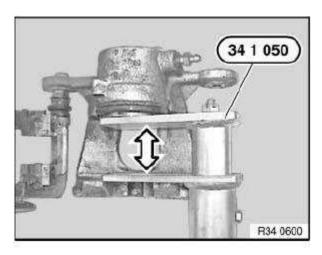


Fig. 17: Identifying Special Tool (34 1 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Check dust sleeve (1) for damage and replace if necessary.

Clean contact face (2) of brake piston and apply a thin coating of anti-squeak compound.

IMPORTANT: Dust sleeve must not come into contact with anti-squeak compound as this may cause the dust sleeve to swell.

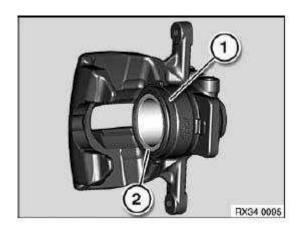


Fig. 18: Identifying Dust Sleeve And Contact Face Of Brake Piston Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact face (1) of brake calliper and apply a thin coating of anti-squeak compound.

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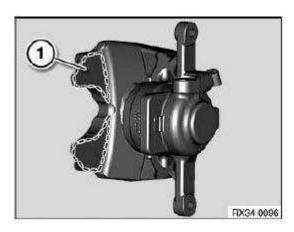


Fig. 19: Identifying Contact Face Of Brake Calliper Courtesy of BMW OF NORTH AMERICA, INC.

Clean hammerhead guides and apply a thin coating of anti-squeak compound.

IMPORTANT: Brake pad with indentation (1) is intended for accommodating the brake pad wear sensor and must be fitted on the piston side.

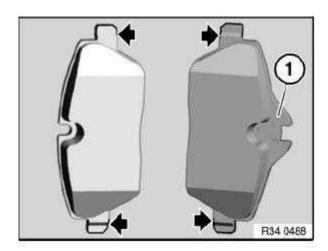


Fig. 20: Identifying Brake Pad With Indentation Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work:

- If necessary, when replacing linings, reset CBS display in accordance with factory specification.
- Fully depress brake pedal several times so that brake pads contact brake discs.
- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- o Read and comply with notes on **BREAKING IN NEW BRAKE DISCS**

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BRAKE PADS.

Replacement:

Remove lining retaining springs (1).

Installation:

Clean contact face of brake carrier and apply a thin coating of anti-squeak compound.

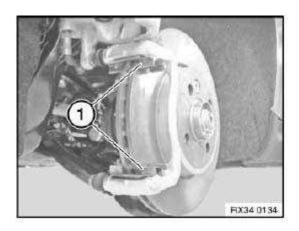


Fig. 21: Identifying Pad Retaining Springs
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 220 REMOVING AND INSTALLING OR REPLACING BOTH FRONT BRAKE DISCS

Special tools required:

• 34 1 280

Necessary preliminary tasks:

• Remove **FRONT BRAKE PADS**

After completing work, read and comply with notes on **BREAKING IN NEW BRAKE DISCS / BRAKE PADS**

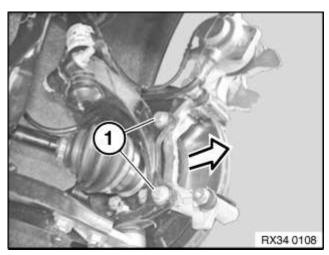
Release screws (1).

Remove brake caliper with brake anchor plate in direction of arrow and tie up.

Installation:

Tightening torque: 34 11 2AZ . See FRONT BRAKE R56 for specs.

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<u>Fig. 22: Identifying Brake Caliper Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove brake disc.

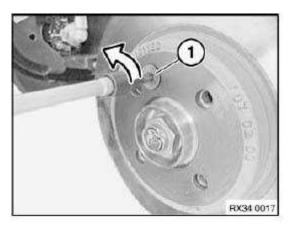
Installation:

Replace screw (1).

Tightening torque: 34 11 1AZ . See **FRONT BRAKE R56** for specs.

Clean contract face of wheel hub thoroughly and remove any traces of rust if necessary.

Irregularities in the contact surface can cause distortion in the brake disc!



<u>Fig. 23: Identifying Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When removing the brake disc: On no account strike the friction ring with a hammer or similar object! If necessary, carefully tap with a rubber hammer against the brake disc nave.

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34 11 250 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT BRAKE CONSOLE/BACK PLATE

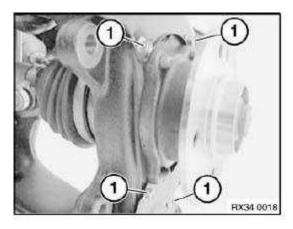
Necessary preliminary tasks:

• REMOVE FRONT BRAKE DISCS

Release screws (1) and remove brake back plate.

Installation:

Tightening torque: 34 11 4AZ . See **FRONT BRAKE R56** for specs.



<u>Fig. 24: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 11 519 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT BRAKE CALIPER

Necessary preliminary tasks:

- Read and comply with <u>GENERAL INFORMATION</u>
- Remove FRONT LEFT OR RIGHT WHEEL

NOTE: After completing tasks, <u>BLEED BRAKE SYSTEM</u>.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

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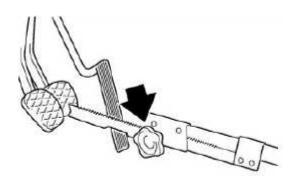


Fig. 25: Locating Pedal Prop Courtesy of BMW OF NORTH AMERICA, INC.

31 34 021

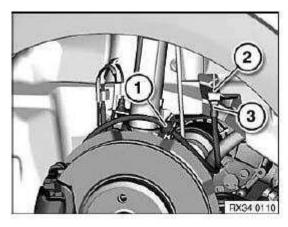
Pull brake hose out of holder (1).

IMPORTANT: Grip brake hose at square head (3) to prevent connecting piece from turning in retaining bracket.

Disconnect brake hose from brake line (2).

Installation:

Tightening torque: 34 32 1AZ . See **BRAKE LINES** for specs.



<u>Fig. 26: Identifying Holder, Brake Line And Square Head</u> Courtesy of BMW OF NORTH AMERICA, INC.

Detach brake hose from brake caliper (1).

Installation:

Tightening torque: 34 32 2AZ . See BRAKE LINES for specs.

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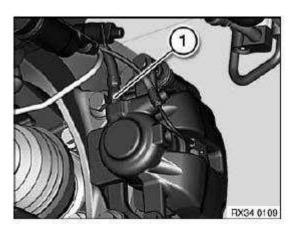


Fig. 27: Identifying Brake Caliper Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

NOTE: First tighten brake hose on brake calliper.

Move wheels into straight-ahead position.

Insert brake hose in bracket and screw onto brake pipe.

Pull brake lining wear sensor (1) out of brake lining (left side only).

Unscrew guide bolts (2).

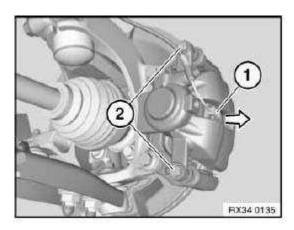
Detach brake caliper in direction of arrow.

Installation:

Replace guide screws.

Tightening torque: 34 11 3AZ . See **FRONT BRAKE R56** for specs.

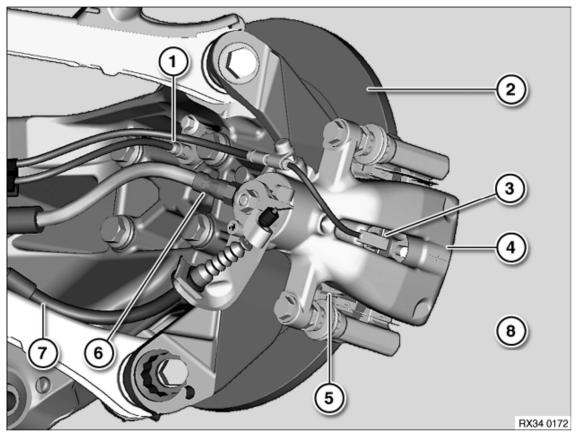
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<u>Fig. 28: Identifying Brake Lining Wear Sensor And Guide Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

21 REAR BRAKES

34 21 ... OVERVIEW OF REAR BRAKES



<u>Fig. 29: Overview Of Rear Brakes</u> Courtesy of BMW OF NORTH AMERICA, INC.

REAR BRAKES OVERVIEW

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1		Pulse generator, rear	2	Brake discs
3	}	Brake-pad wear sensor	4	Brake caliper
5	,	Brake pads	6	Brake hose
7	1	Handbrake Bowden cables		

34 21 200 REMOVING AND INSTALLING/REPLACING BOTH REAR DISC BRAKES

Special tools required:

- 34 1 280
- 34 6 306
- 34 6 307
- 34 6 308
- 34 6 309

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

Necessary preliminary tasks:

- Remove WHEELS
- Remove **BRAKE PAD WEAR SENSOR**

Detach locking clip (1) in direction of arrow.

Disengage parking brake Bowden cable (2) from actuating lever (3) at brake caliper.

Feed out parking brake Bowden cable (2) downwards.

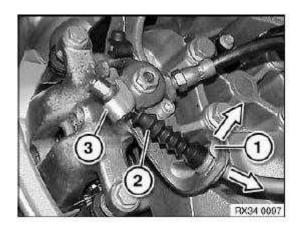


Fig. 30: Identifying Parking Brake Bowden Cable And Locking Clip Courtesy of BMW OF NORTH AMERICA, INC.

Pull brake pad wear sensor towards rear out of lining (right side only).

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If necessary, replace brake pad wear sensor.

Unscrew guide bolts (1).

If necessary, grip at hexagon head (2).

IMPORTANT: Both guide bolts must be released and then the brake caliper detached towards the rear!

The springs may be bent when only one bolt is released and the brake caliper is folded up!

Installation:

Replace guide screws.

Tightening torque: 34 21 3AZ . See **REAR BRAKE** for specs.

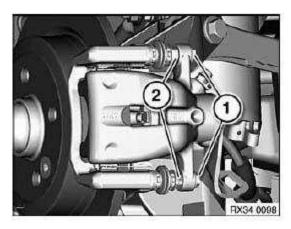


Fig. 31: Identifying Guide Bolts And Hexagon Head Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Remove brake pads (1) in direction of arrow from brake console.

Observe **MINIMUM THICKNESS OF BRAKE PADS** .

Clean brake pads.

Do not apply grease to brake pad backplate.

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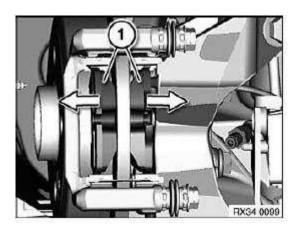


Fig. 32: Identifying Brake Pads Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- o Position special tool 34 1 280 at three measuring points in area (1) and measure.
- o Compare measurement result and lowest value with **SETPOINT VALUE**.

New brake linings may only be installed if the brake disc thickness is greater than or equal to the **MINIMUM BRAKE DISC THICKNESS (MIN TH)**.

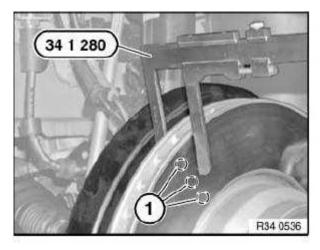


Fig. 33: Identifying Special Tool (34 1 280) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When pressing piston back, note brake fluid level in expansion tank.

Overflowing brake fluid will damage the paintwork.

Insert brake piston into brake caliper with special tools 34 6 309, 34 6 306, 34 6 307, 34 6 308.

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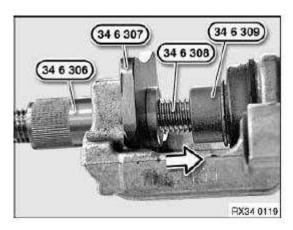


Fig. 34: Identifying Special Tools (34 6 309, 34 6 306, 34 6 307 And 34 6 308) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Dust sleeve must not come into contact with anti-squeak compound as this may cause the dust sleeve to swell.

Check dust sleeve (1) for damage and replace if necessary.

Clean contact face (2) of brake piston and apply a thin coating of anti-squeak compound.

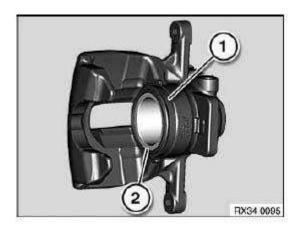


Fig. 35: Identifying Dust Sleeve And Contact Face Of Brake Piston Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact face (1) of brake caliper and apply a thin coating of anti-squeak compound.

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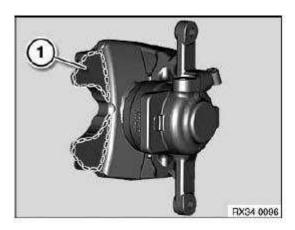


Fig. 36: Identifying Contact Face Of Brake Calliper Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Brake pad with indentation (1) is intended for accommodating the brake pad wear sensor and must be fitted on the piston side.

Clean hammerhead guides and apply a thin coating of anti-squeak compound.

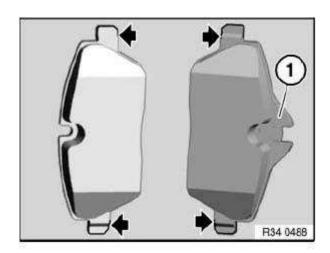


Fig. 37: Identifying Brake Pad With Indentation Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: After completing work:

- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- Read and comply with notes on <u>BREAKING IN NEW BRAKE DISCS /</u> BRAKE PADS.
- Fully depress brake pedal several times so that brake pads contact brake discs.
- o If necessary, when replacing pads, reset CBS display in accordance with

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factory specification.

Replacement:

Remove lining retaining springs (1).

Installation:

Clean contact face of brake carrier and apply a thin coating of anti-squeak compound.

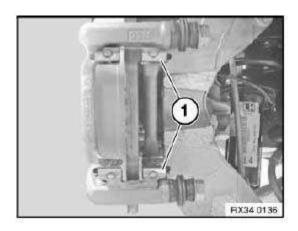


Fig. 38: Identifying Lining Retaining Springs
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 320 REMOVING AND INSTALLING/REPLACING BOTH BRAKE DISCS

Special tools required:

• 34 1 280

IMPORTANT: Always replace brake discs in pairs.

New brake pads must always be fitted when replacing the brake discs.

Necessary preliminary tasks:

• REMOVE REAR BRAKE PADS

Check minimum brake disc thickness:

- o Position special tool 34 1 280 at three measuring points in area (1) and measure.
- o Compare measurement result and lowest value with **SETPOINT VALUE**.

New brake linings may only be installed if the brake disc thickness is greater than or equal to the **MINIMUM BRAKE DISC THICKNESS (MIN TH)**.

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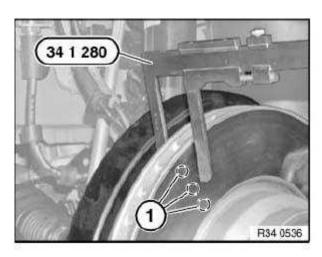


Fig. 39: Identifying Special Tool (34 1 280) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When removing the brake disc: On no account strike the friction ring with a hammer or similar object! If necessary, carefully tap with a rubber hammer against the brake disc nave.

Release retaining screw

Remove brake disc.

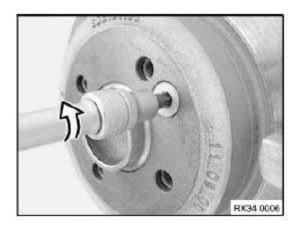
Installation:

Replace screw.

Tightening torque: 34 21 1AZ . See **<u>REAR BRAKE</u>** for specs.

Clean contract face of wheel hub thoroughly and remove any traces of rust if necessary.

Irregularities in the contact surface can cause distortion in the brake disc!



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Fig. 40: Identifying Retaining Screw
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 745 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR BRAKE CALIPER

Necessary preliminary tasks:

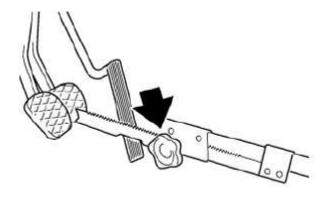
- READ AND COMPLY WITH GENERAL INFORMATION.
- Remove FRONT LEFT OR RIGHT WHEEL

NOTE: After completing tasks, <u>BLEED BRAKE SYSTEM</u>.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



31 34 021

Fig. 41: Locating Pedal Prop Courtesy of BMW OF NORTH AMERICA, INC.

Detach locking clip (1) in direction of arrow.

Disengage parking brake Bowden cable (2) from actuating lever (3) at brake caliper.

Feed out parking brake Bowden cable (2) downwards.

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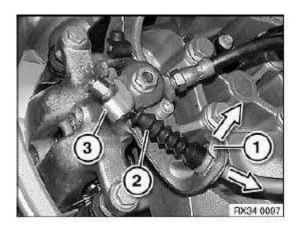


Fig. 42: Identifying Parking Brake Bowden Cable And Locking Clip Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Disconnect brake hose from brake line (1).

Installation:

Tightening torque: 34 32 1AZ . See BRAKE LINES for specs.

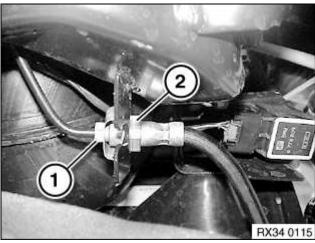


Fig. 43: Identifying Brake Line And Square Head Courtesy of BMW OF NORTH AMERICA, INC.

Disengage brake hose from holder (1).

Detach brake hose (2) from brake caliper.

Installation:

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Tightening torque: 34 32 3AZ . See **BRAKE LINES** for specs.

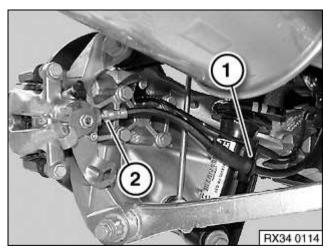


Fig. 44: Identifying Holder And Brake Hose Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

NOTE: First tighten brake hose on brake calliper.

Insert brake hose in bracket and screw onto brake pipe.

Pull brake lining wear sensor out of brake lining (right side only).

Unscrew guide bolts (1).

If necessary, grip at hexagon head (2).

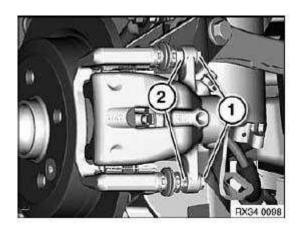
Remove brake caliper.

Installation:

Replace guide screws.

Tightening torque: 34 21 3AZ . See **REAR BRAKE** for specs.

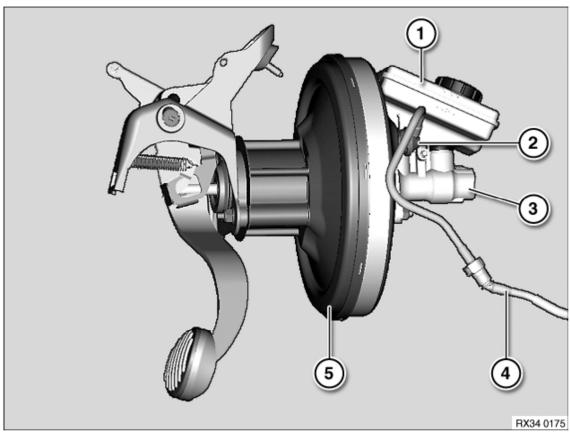
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<u>Fig. 45: Identifying Guide Bolts And Hexagon Head</u> Courtesy of BMW OF NORTH AMERICA, INC.

31 MASTER BRAKE CYLINDER

34 31 ... OVERVIEW OF BRAKE MASTER CYLINDER / BRAKE BOOSTER



<u>Fig. 46: Identifying Brake Master Cylinder / Brake Booster</u> Courtesy of BMW OF NORTH AMERICA, INC.

BRAKE MASTER CYLINDER / BRAKE BOOSTER COMPONENTS

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1	1	Expansion tank	2	Non-return valve
1	3	Brake master cylinder	4	Vacuum hose
1		5	Brake	
1			booster	

34 31 181 REMOVING AND INSTALLING / REPLACING EXPANSION TANK FOR HYDRAULIC BRAKE ACTUATION

Necessary preliminary tasks:

- Read and comply with **GENERAL INFORMATION**
- Remove **COVER FOR COWL PANEL** on left

NOTE: Suck the brake fluid out of the expansion tank.

Use a suction bottle used exclusively for drawing off brake fluid.

Do not reuse drawn out brake fluid.

Unfasten plug connection (1) and disconnect.

Pull off supply hose (2) on clutch hydraulics.

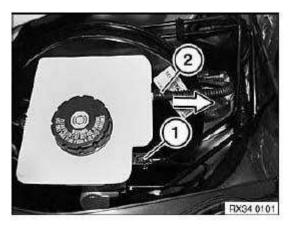


Fig. 47: Identifying Plug Connection And Supply Hose Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and lift off expansion tank.

Installation:

Tightening torque: 34 31 2AZ . See **BRAKE MASTER CYLINDER** for specs.

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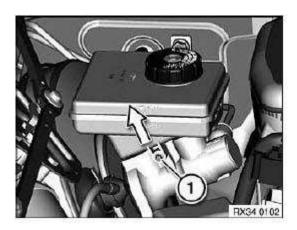
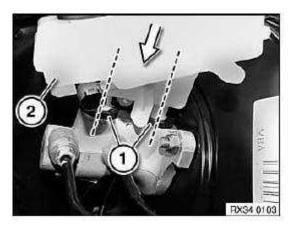


Fig. 48: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check rubber plugs (1) in brake master cylinder for damage and replace if necessary.

Press expansion tank (2) vertically onto brake master cylinder.



<u>Fig. 49: Identifying Rubber Plugs And Expansion Tank</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 31 500 REMOVING AND INSTALLING/REPLACING BRAKE MASTER CYLINDER

Special tools required:

• 32 1 270

Necessary preliminary tasks:

- Remove **EXPANSION TANK**.
- Read and comply with **GENERAL INFORMATION**.

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After completing tasks, bleed **BRAKE SYSTEM WITH DSC**.

IMPORTANT: Do not bend brake lines.

Close off brake lines and brake master cylinder with plugs 32 1 270.

Unfasten brake lines (1).

Installation:

Tightening torque: 34 32 1AZ . See **BRAKE LINES** for specs.

Release nuts (2) and feed brake master cylinder out of brake booster.



<u>Fig. 50: Identifying Brake Lines And Nut</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace self-locking nuts.

Tightening torque: 34 31 1AZ . See **BRAKE MASTER CYLINDER** for specs.

Installation:

Replace sealing ring (1).

Check rubber plugs (2) and replace if necessary.

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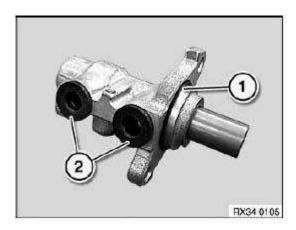


Fig. 51: Identifying Rubber Plugs And Sealing Ring Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When inserting the brake master cylinder (1) into the brake booster, make sure the pressure rod of the brake booster and the brake master cylinder meet each other on one level.

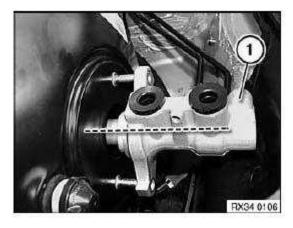


Fig. 52: Identifying Brake Master Cylinder Courtesy of BMW OF NORTH AMERICA, INC.

32 BRAKE LINES

34 32 861 REPLACING ALL BRAKE PIPES

Special tools required:

• <u>34 5 100</u>

NOTE: The brake lines are only supplied in the straight version and correct length with connecting nipple.

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Read and comply with GENERAL INFORMATION.

After completing tasks, **BLEED BRAKE SYSTEM**.

OBSERVE SAFETY INSTRUCTIONS ON RAISING THE VEHICLE.

New brake lines are bent into shape with bending tool 34 5 100.

Removed brake pipes can be used as templates for bending.

IMPORTANT:

- o Protective coating of brake line must not be damaged during bending.
- Do not kink or bend back brake lines.
- Watch distances to rigid and movable vehicle parts. Brake lines may not make contact or rub.
- Tighten down brake line couplings with torque wrench.

Installation:

Tightening torque: 34 32 1AZ. See BRAKE LINES for specs.

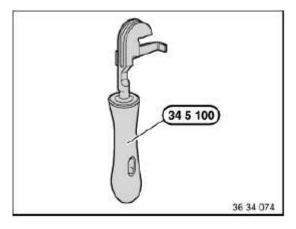


Fig. 53: Identifying Special Tool (34 5 100)
Courtesy of BMW OF NORTH AMERICA, INC.

34 32 881 REPLACING FRONT LEFT OR RIGHT BRAKE HOSES

NOTE: Read and comply with <u>GENERAL INFORMATION</u>.

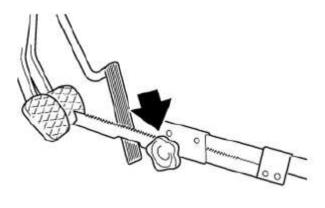
After completing tasks, **BLEED BRAKE SYSTEM**.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

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This prevents brake fluid from emerging from the expansion tank when the brake lines are opened.



31 34 021

Fig. 54: Locating Pedal Prop Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grip brake hose at square head (3) to prevent connecting piece from turning in retaining bracket.

Pull brake hose out of holder (1).

Disconnect brake hose from brake line (2).

Installation:

Tightening torque: 34 32 1AZ . See **BRAKE LINES** for specs.

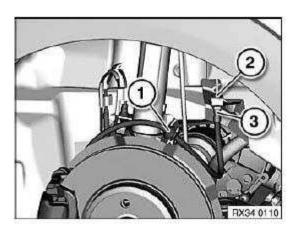


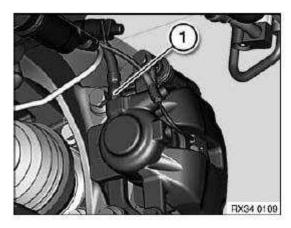
Fig. 55: Identifying Holder, Brake Line And Square Head Courtesy of BMW OF NORTH AMERICA, INC.

Detach brake hose from brake caliper (1).

2007 BRAKES Brakes - Repair Instructions - Cooper

Installation:

Tightening torque: 34 32 2AZ . See **BRAKE LINES** for specs.



<u>Fig. 56: Identifying Brake Caliper</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: First tighten brake hose on brake caliper.

Move wheels into straight-ahead position.

Insert brake hose in bracket and screw onto brake pipe.

Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

34 32 980 REPLACING REAR LEFT OR RIGHT BRAKE HOSES

Necessary preliminary tasks:

- READ AND COMPLY WITH GENERAL INFORMATION.
- Partially detach <u>UNDERBODY PANELLING</u>

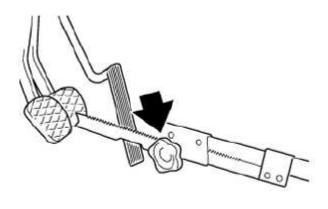
After completing tasks, bleed brake system.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank when the brake lines are opened.

2007 BRAKES Brakes - Repair Instructions - Cooper



31 34 021

Fig. 57: Locating Pedal Prop Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Disconnect brake hose from brake line (1).

Installation:

Tightening torque: 34 32 1AZ . See **BRAKE LINES** for specs.

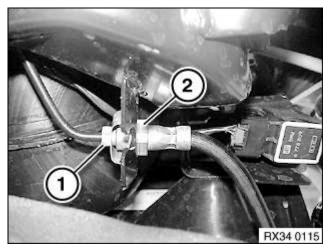


Fig. 58: Identifying Brake Line And Square Head Courtesy of BMW OF NORTH AMERICA, INC.

Disengage brake hose from holder (1).

Detach brake hose (2) from brake caliper.

Installation:

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Tightening torque: 34 32 3AZ . See **BRAKE LINES** for specs.

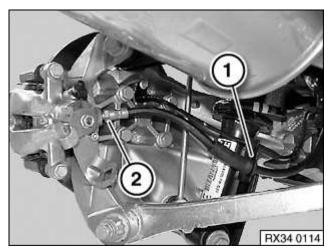


Fig. 59: Identifying Holder And Brake Hose Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

NOTE: First tighten brake hose on brake caliper.

Insert brake hose in bracket and screw onto brake pipe.

33 BRAKE BOOSTER

34 33 000 REMOVING AND INSTALLING OR REPLACING BRAKE BOOSTER

Necessary preliminary tasks:

- Read and comply with **GENERAL INFORMATION**
- Remove **BRAKE MASTER CYLINDER**
- Remove left **FOOTWELL TRIM**

Detach locking clip (1) from brake pedal, disengage and pull out locking pin.

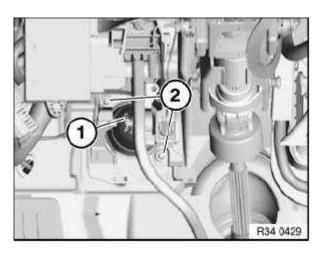
Unscrew nuts (2).

Installation:

Replace self-locking nuts.

Tightening torque: 34 33 1AZ. See **BRAKE BOOSTER** for specs.

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<u>Fig. 60: Identifying Locking Clip And Nut</u> Courtesy of BMW OF NORTH AMERICA, INC.

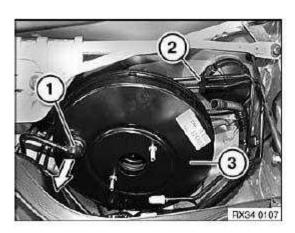
Pull non-return valve (1) in direction of arrow out of brake booster.

Unclip brake lines from holder (2).

IMPORTANT: Do not use any force when removing and installing the brake unit; the brake unit can be damaged under certain circumstances.

Brake lines must not be bent.

Carefully pull brake booster (3) out of bulkhead and tilt out in upward direction.



<u>Fig. 61: Identifying Non-Return Valve, Holder And Brake Booster</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 33 051 REPLACING NON-RETURN VALVE FOR BRAKE BOOSTER

Necessary preliminary tasks:

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- Remove **COVER FOR COWL PANEL** on left
- Remove **INTAKE FILTER HOUSING**

Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to detach the vacuum hose.

The non-return valve and the moulded hose are permanently connected to each other are replaced together as a single unit.

Remove non-return valve (1) from brake booster.

Installation:

Check seal in brake booster and replace if necessary.

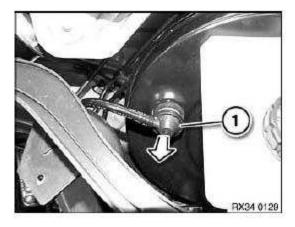
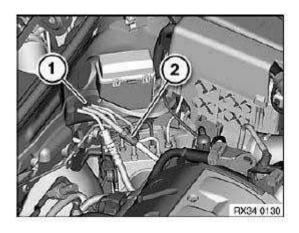


Fig. 62: Identifying Non-Return Valve Courtesy of BMW OF NORTH AMERICA, INC.

Remove line holder (1).

Disconnect quick-release fastener (2) and feed out vacuum line with non-return valve.



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<u>Fig. 63: Identifying Line Holder And Quick-Release Fastener</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 33 071 REPLACING VACUUM HOSE FOR BRAKE BOOSTER (N12)

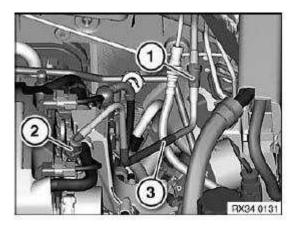
Necessary preliminary tasks:

• Remove INTAKE FILTER HOUSING

Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to detach the vacuum hose.

Detach quick-release fastener (1).

Unlock quick-release fastener (2) and detach vacuum line (3).



<u>Fig. 64: Identifying Quick-Release Fastener And Vacuum Line</u> Courtesy of BMW OF NORTH AMERICA, INC.

35 ELECTRICAL COMPONENTS

34 35 001 REPLACING A FRONT BRAKE PAD SENSOR

Necessary preliminary tasks:

• Remove WHEEL

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad sensor that has already been ground has to be replaced even though the MINIMUM BRAKE PAD THICKNESS has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

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Press clip (1) together and detach brake pad sensor (2) in direction of arrow from brake caliper.

Unclip brake pad sensor (2) from holder (3).

Installation:

Make sure clip (1) and brake pad sensor (2) are correctly seated in brake caliper.

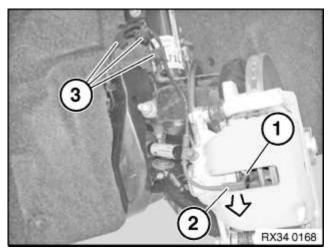
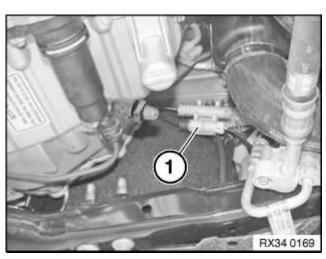


Fig. 65: Identifying Brake Pad Sensor, Clip, And Holder Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Installation:

Make sure plug connection engages correctly.



<u>Fig. 66: Identifying Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

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34 35 001 REPLACING A REAR BRAKE PAD SENSOR

Necessary preliminary tasks:

- Remove WHEEL
- Remove **REAR RIGHT UNDERBODY PANELLING**

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad sensor that has already been ground has to be replaced even though the <u>MINIMUM BRAKE PAD THICKNESS</u> has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

Detach brake pad sensor (1) in direction of arrow from brake caliper.

Unclip brake pad sensor (1) from holder (2).

Installation:

Make sure brake pad sensor (1) is correctly seated in brake caliper.

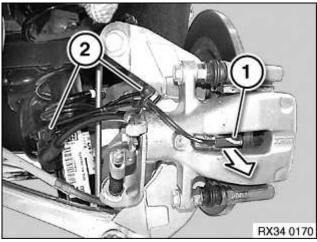


Fig. 67: Unclipping Brake Pad Sensor From Holder Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unclip brake pad sensor from holder (2).

Installation:

Make sure plug connection engages correctly.

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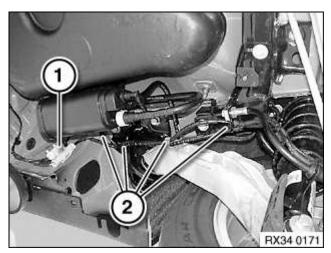


Fig. 68: Identifying Brake Pad Sensor Plug Connection And Holders Courtesy of BMW OF NORTH AMERICA, INC.

41 PARKING BRAKE

34 10 014 ADJUSTING HANDBRAKE

Special tools required:

- 34 6 306
- 34 6 307
- 34 6 308
- 34 6 309

Perform inspection in the following manner:

When 1st ratchet is engaged, no braking force should be exerted.

The difference in wheel circumferential forces between the left and right wheels may deviate by max. 30 % from the greater value (measured on brake analyzer).

In event of larger deviations of wheel circumferential force: readjust handbrake.

Braking with locked wheels must be possible with the handbrake.

The handbrake must be readjusted if the actuation stroke is greater than 6 teeth.

NOTE: The handbrake can only be adjusted correctly when the parking brake Bowden cables and all moving handbrake parts are free to move and fully operational.

Basic handbrake adjustment is necessary:

o In event of excessive actuation stroke (6 teeth).

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- When replacing parking brake Bowden cables
- o When replacing handbrake lever.

Setting instruction for parking brake Bowden cables

Release gaiter (1) of parking brake lever from clip.

Release self-locking nut (2) until the load on the Bowden cable has been relieved completely.

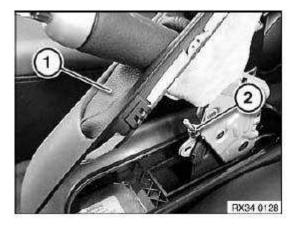


Fig. 69: Identifying Gaiter And Self-Locking Nut Courtesy of BMW OF NORTH AMERICA, INC.

REMOVE REAR BRAKE PADS.

Insert brake piston into brake caliper with special tools 34 6 309, 34 6 306, 34 6 307, 34 6 308.

Install brake pads.

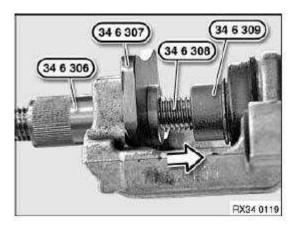


Fig. 70: Identifying Special Tool 34 6 309, 34 6 306, 34 6 307 And 34 6 308 Courtesy of BMW OF NORTH AMERICA, INC.

Screw in adjusting nut on handbrake lever until a gap (A) of 0.5 - 1.5 mm between handbrake actuating lever

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(2) and stop (1) is set at brake calipers.

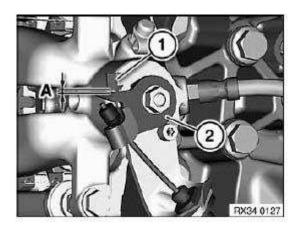


Fig. 71: Identifying Handbrake Actuating Lever Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe following sequence:

- 1. Release adjusting nut on handbrake lever completely.
- 2. Remove brake pads.
- 3. Insert brake piston into brake caliper.
- 4. Install brake pads.
- 5. Adjust adjusting nut on handbrake lever as shown above.
- 6. Apply handbrake lever three times.
- 7. Press brake pedal to floor at least three times so that air gap can be set.
- 8. Carry out operational check

Checking adjustment on brake analyzer

0th tooth (handbrake released): Vehicles with manual transmission: Shift lever in neutral position.

Vehicles with automatic transmission: Selector lever in "N" position wheel circumferential force < or =100 N.

1st tooth: No increase in braking force with regard to 0th tooth. Indicator lamp can be lit.

2nd tooth: An increase in braking force must take place. Indicator lamp must be lit.

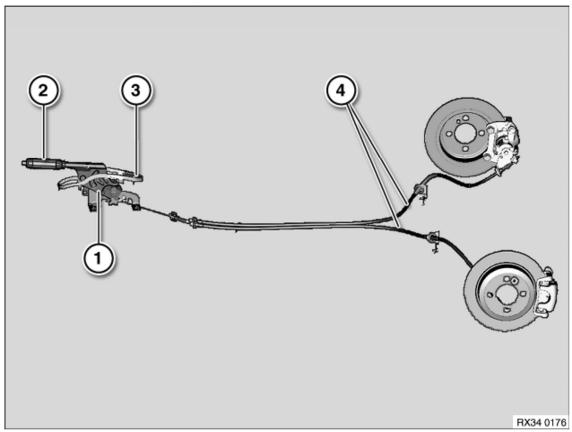
3rd tooth: Increase in braking force.

4th tooth: Wheel circumferential force per wheel: 700 N to 1300 N.

(Must be achieved in the 4th tooth at the latest)

34 41 ... OVERVIEW OF PARKING BRAKE

2007 BRAKES Brakes - Repair Instructions - Cooper



<u>Fig. 72: Overview Of Parking Brake</u> Courtesy of BMW OF NORTH AMERICA, INC.

OVERVIEW OF PARKING BRAKE

1	Handbrake lever	2	Handle for handbrake lever
3	Gaiter for handbrake lever	4	Handbrake Bowden cables

34 41 ... REMOVING AND INSTALLING OR REPLACING BOOT FOR HANDBRAKE LEVER

Special tools required:

• <u>00 9 317</u>

Unclip boot with special tool 00 9 317.

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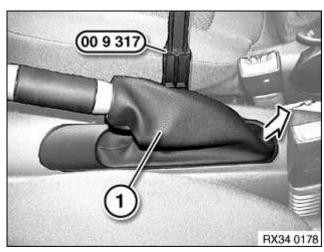


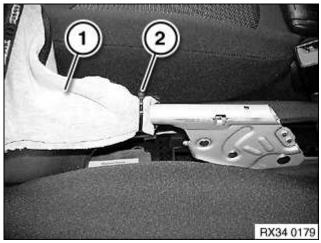
Fig. 73: Identifying Boot And Special Tool (00 9 317) Courtesy of BMW OF NORTH AMERICA, INC.

Pull boot (1) over handbrake lever.

Cut cable ties (2) and remove boot.

Installation:

Eye of cable tie must face downward



<u>Fig. 74: Identifying Boot And Cable Ties</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 41 001 REMOVING AND INSTALLING HANDBRAKE LEVER

Necessary preliminary tasks:

• REMOVE REAR STORAGE COMPARTMENT HOLDER

After completing tasks, **ADJUST HANDBRAKE**.

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Release adjustment unit (1) for handbrake lever.

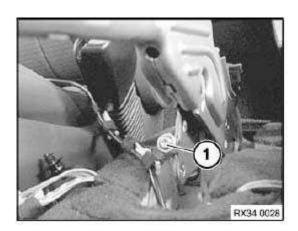


Fig. 75: Identifying Adjustment Unit Courtesy of BMW OF NORTH AMERICA, INC.

Detach both parking brake Bowden cables from balance arm.

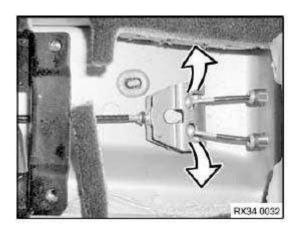


Fig. 76: Identifying Parking Brake Bowden Cables Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for handbrake check switch.

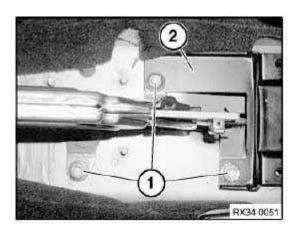
Release screws (1) and remove fastener (2).

Installation:

Tightening torque: 34 41 1AZ . See **PARKING BRAKE** for specs.

Remove handbrake lever.

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<u>Fig. 77: Identifying Screws And Fastener</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 41 120 REMOVING AND INSTALLING / REPLACING BOTH HANDBRAKE BOWDEN CABLES

Special tools required:

• <u>34 6 330</u>

Necessary preliminary tasks:

- REMOVE BRACKET ON CENTRE CONSOLE
- Release heat shield and slide over exhaust system

After completing tasks, **ADJUST HANDBRAKE**

Release adjusting fixture (1) for parking brake Bowden cable.

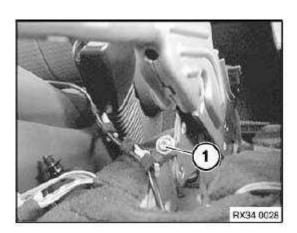
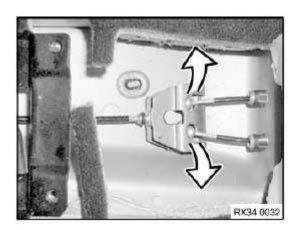


Fig. 78: Identifying Adjustment Unit Courtesy of BMW OF NORTH AMERICA, INC.

Detach both parking brake Bowden cables from balance arm.

2007 BRAKES Brakes - Repair Instructions - Cooper



<u>Fig. 79: Identifying Parking Brake Bowden Cables</u> Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 34 6 330 to parking brake Bowden cable (1).

Slide special tool 34 6 330 in direction of arrow onto barbs of parking brake Bowden cable (1) until barbs are free.

Push parking brake Bowden cable towards rear.

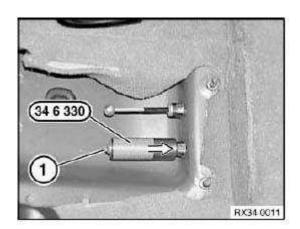


Fig. 80: Identifying Special Tool (34 6 330) Courtesy of BMW OF NORTH AMERICA, INC.

Release cable assemblies from clips (1) on fuel tank.

Release screws (2) and remove bracket from control arm at top.

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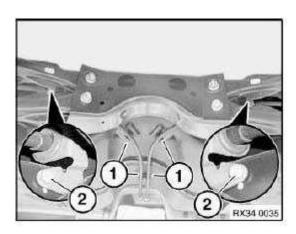


Fig. 81: Identifying Clips And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach locking clip (1) in direction of arrow.

Disengage parking brake Bowden cable (2) from actuating lever (3) at brake caliper.

Feed out parking brake Bowden cable (2) downwards.

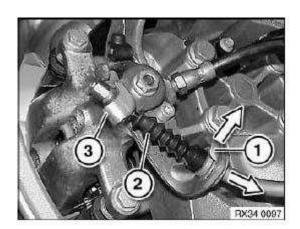


Fig. 82: Identifying Parking Brake Bowden Cable And Locking Clip Courtesy of BMW OF NORTH AMERICA, INC.

51 MECHANICAL-HYDRAULIC COMPONENTS

34 51 525 REMOVING AND INSTALLING/REPLACING HYDRAULIC UNIT FOR ASC+T

NOTE: This operation is described in the section headed Removing and installing HYDRAULIC UNIT FOR DSC.

34 51 527 REMOVING AND INSTALLING/REPLACING HYDRAULIC UNIT FOR DSC

Necessary preliminary tasks:

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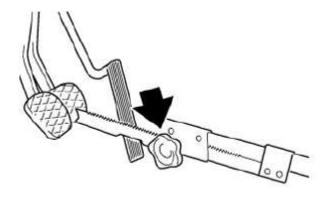
- Remove AIR CLEANER
- READ AND COMPLY WITH GENERAL INFORMATION.

After completing tasks, **BLEED BRAKE SYSTEM**.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from escaping from the expansion tank and air from entering the system after the brake lines have been disconnected.



31 34 021

Fig. 83: Locating Pedal Prop Courtesy of BMW OF NORTH AMERICA, INC.

Remove line holder (1) from bulkhead.

Disconnect plug connection (2).

IMPORTANT: Do not mix up brake lines and if necessary mark prior to removal.

Close off connection bores with plugs.

Brake lines must not be bent.

Unfasten brake lines (3).

Installation:

Tightening torque: 34 32 1AZ . See **BRAKE LINES** for specs.

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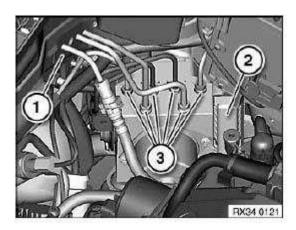


Fig. 84: Identifying Line Holder, Plug Connection And Brake Lines Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

The clutch hydraulic line can be easily pressed to one side by release the holder.

Release screw (2).

Installation:

Tightening torque: 34 51 2AZ . See **SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)** for specs.

First raise hydraulic unit (3) a little and then swing out.

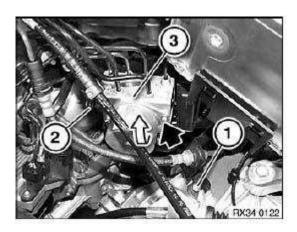


Fig. 85: Identifying Hydraulic Unit And Screw Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure rubber mounts (1) are correctly fitted in bores.

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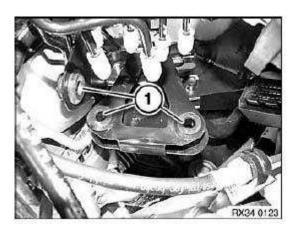


Fig. 86: Identifying Rubber Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

Adjustment of steering angle sensor

Mix-up check of brake lines

Function check, hydraulic unit

Replacement:

o Carry out **PROGRAMMING/CODING**

52 ELECTRONIC COMPONENTS

34 52 ... OVERVIEW OF ELECTRONIC COMPONENTS

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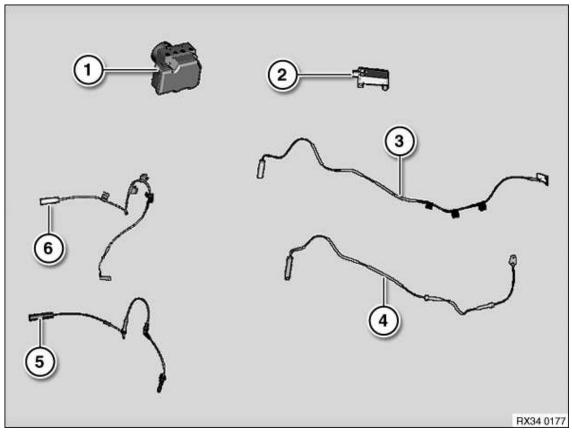


Fig. 87: Overview Of Electronic Components
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRONIC COMPONENTS: OVERVIEW

ELECTROPIC COMPONENTS OF ERVIEW				
1	DSC control unit	2	DSC sensor	
3	Brake pad sensor, rear	4	Pulse generator, rear	
5	Pulse generator, front	6	Brake pad sensor, front	

34 52 516 REMOVING AND INSTALLING / REPLACING DSC CONTROL UNIT

Necessary preliminary tasks:

• Remove **HYDRAULIC UNIT**

Release screws (1) and carefully remove control unit (2).

Necessary preliminary tasks:

Tightening torque: 34 51 1AZ . See **SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)** for specs.

Observe following notes on installation.

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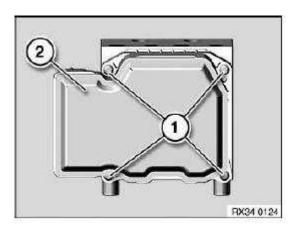


Fig. 88: Identifying Screws And Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not use force to fit the control unit.

The two pins (2) must not be bent under any circumstances!

Installation:

Carefully insert control unit (1) in direction of arrow, paying attention to the two pins (2).

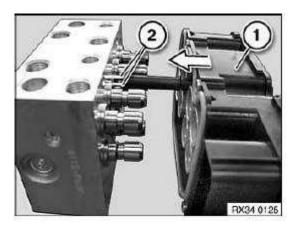


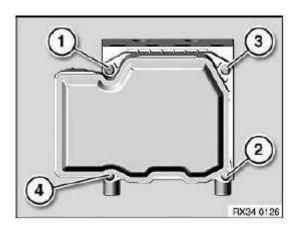
Fig. 89: Identifying Control Unit And Pins Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe tightening sequence (1-4).

Tightening torque: 34 51 1AZ . See **SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)** for specs.

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<u>Fig. 90: Identifying Pins</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- o Carry out **PROGRAMMING/CODING**
- o Adjustment of steering angle sensor

34 52 525 REPLACING ONE FRONT PULSE GENERATOR

Necessary preliminary tasks:

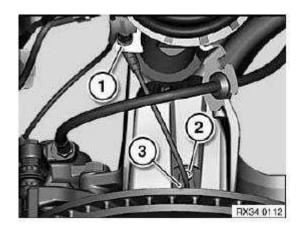
• REMOVE WHEEL

Remove cable from holder (1) on spring strut.

Release screw (2) and remove pulse generator (3).

Installation:

Tightening torque: 34 51 4AZ . See **SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)** for specs.



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Fig. 91: Identifying Holder, Screw And Pulse Generator Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Installation:

Make sure plug connection engages correctly.

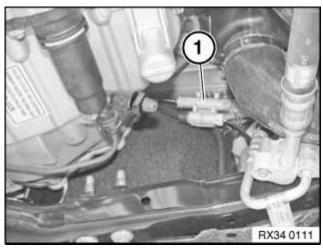
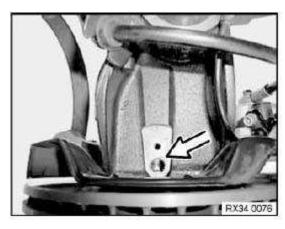


Fig. 92: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean bore hole for pulse generator and grease with Staburags NBU 12/K lubricating grease.



<u>Fig. 93: Locating Bore Hole</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 52 535 REPLACING A REAR PULSE GENERATOR

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Necessary preliminary tasks:

• Partially detach **REAR UNDERBODY PANELLING**

Release cable from retaining clip on rear axle carrier (1).

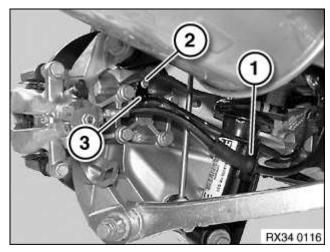
Disengage cable from holder (1) at shock absorber.

Release screw (2) and remove pulse generator (3).

Installation:

Tightening torque: 34 51 4AZ . See **SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)** for specs.

Clean bore hole for pulse generator and grease with Staburags NBU 12/K lubricating grease.



<u>Fig. 94: Locating Bore Hole</u> Courtesy of BMW OF NORTH AMERICA, INC.

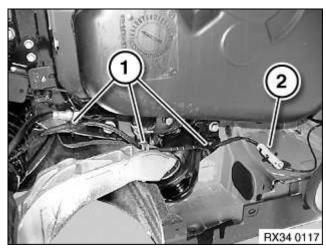
Unclip cable from retainers (1).

Disconnect plug connection (2).

Installation:

Make sure plug connection engages correctly.

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<u>Fig. 95: Identifying Retaining Clips And Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 52 550 REMOVING AND INSTALLING/REPLACING DSC YAW SENSOR (DSC SENSOR)

Necessary preliminary tasks:

- Remove PASSENGER SEAT
- If necessary, remove cover for video module

Disconnect plug connection (1).

IMPORTANT: Vibration-sensitive component.

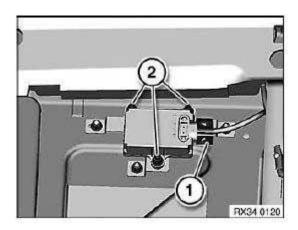
Implement screw connection correctly, otherwise there may be malfunctions in the DSC.

Release nuts (2) and remove DSC sensor.

Installation:

Tightening torque: 34 51 5AZ . See <u>SLIP CONTROL SYSTEM (ABS, ASC+T, DSC)</u> for specs.

2007 BRAKES Brakes - Repair Instructions - Cooper



<u>Fig. 96: Identifying Plug Connection And Nut</u> Courtesy of BMW OF NORTH AMERICA, INC.

90 TROUBLESHOOTING

34 90 ... TROUBLESHOOTING BRAKE SYSTEM

TROUBLESHOOTING BRAKE SYSTEM

Fault	Cause	Remedy
Brakes pull to one side	a. Tyre inflation pressure not in keeping with regulations	a. Correct tyre inflation pressure
	b. Unevenly worn tyre treads	b. Change or replace tyres
	c. Oil on pads/liners	c. Replace brake pads,
	d. Wrong type of pads/linerse. Guide bolts dirty or damaged	Check for causes
	f. Axle geometry not correct	d. Replace brake pads,
	g. Corrosion in floating calipers	Check for causes
	h. No shock absorber action	e. Replace guide bolts
	i. Pad of one caliper worn	f. Check wheel alignment
		g. Remove and install, repair or replace floating calipers
		h. Check shock absorbers, replace if necessary
		i. Replace brake pads, check floating caliper
Brakes excessively hot while driving	a. Compensating port in brake master cylinder blocked	a. Replace master brake cylinder
	b. Swollen rubber parts due to use of wrong brake fluid	b. Replace master brake cylinder

2007 BRAKES Brakes - Repair Instructions - Cooper

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	c. Bleeder hole on expansion tank blockedd. Corroded floating caliperse. Handbrake lever not released fully	 c. Clean expansion tank d. Remove and install, repair or replace floating calipers e. Check handbrake and handbrake Bowden cables,
		repair if necessary
Poor braking effect in spite of great force on pedal Travel at brake pedal normal	Brake pads oil-splattered or burnt; wrong type of brake pads	
Poor braking effect in spite of great force on pedal Travel at brake pedal too short	Brake booster malfunctions - engine vacuum	Check brake booster
Poor braking effect in spite of great force on pedal Travel at brake pedal too long	One brake circuit failed due to leaks or damage	Leakage test of brake system
Brake pedal can be pressed down	a. Air in brake system	a. Bleed brakes
softly and springily	b. Not enough brake fluid in expansion tank	b. Top up or change brake fluid
	c. Overheated brake fluid - vapour lock due to excessive water content in brake fluid	Bleed brakes
	or excessive brake loads	c. Change brake fluid,
		Bleed brakes
Brake is bled and readjusted, but brake pedal can be pressed down too far	a. Primary cup seal in brake master cylinder damaged	a. Replace master brake cylinder
100 141	b. Leaking separating cup seals on floating piston of brake	b. Replace master brake cylinder
	master cylinder c. Leak in brake system	c. Leakage test of brake system
Uneven pad wear	a. Wrong type of pads/liners	a. Replace brake pads
	b. Dirty floating caliper recesses, damaged caps	b. Remove and install, repair or replace floating calipers
	c. Corrosion in floating calipers	c. Remove and install, repair or replace floating calipers
	d. Swollen rubber ring for piston control	d. Remove and install, repair or replace floating calipers
Brake pads worn at angle	a. Wheel-bearing play	a. Replace wheel bearings
	excessiveb. Brake disc not aligned with	b. Check floating caliper installation
	floating caliper	c. Remove and install, repair

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	 c. Corrosion in floating calipers d. Angular brake-disc wear e. Minimum pad thickness undershot f. Spring force insufficient g. Guide bolts damaged 	or replace floating calipers d. Replace brake discs e. Replace brake pads f. Replace spring g. Replace guide bolts
Seized brake pads, pad does not move off brake disc	 a. Dirty floating caliper recesses, damaged caps b. Corrosion in floating calipers c. Compensating port in brake master cylinder blocked 	 a. Remove and install, repair or replace floating calipers b. Remove and install, repair or replace floating calipers c. Replace master brake cylinder
Brakes squeal or rattle	 a. Wrong type of pads/liners b. Dirty floating caliper recesses c. Spring force insufficient d. Brake disc not aligned with floating caliper e. Brake-disc runout f. Excessive thickness deviation within braking surface g. Liner wear excessive or one-sided h. Rust edges on brake discs i. Pad loose j. Wheel-bearing play excessive 	 a. Replace brake pads b. Remove and install/clean floating calipers c. Replace spring d. Check floating caliper installation e. Replace brake discs f. Measure brake disc thickness Replace discs g. Replace brake shoes h. Replace brake discs i. Replace brake pads j. Replace wheel bearings
Brake-pedal dead travel excessive	 a. Wheel-bearing play excessive b. Brake disc not aligned with floating caliper c. Brake-disc runout d. Excessive thickness deviation within braking surface e. Brake system leaking f. Air in brake system g. Wrong type of pads/liners 	 a. Replace wheel bearings b. Check floating caliper installation c. Replace brake discs d. Measure brake disc thickness Replace discs e. Leakage test of brake system f. Bleed brakes

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		g. Replace brake pads
Jammed piston in brake caliper	a. Dirty floating caliper recesses, damaged caps	a. Remove and install, repair or replace floating caliper
	b. Brake disc not aligned with floating caliper	b. Check floating caliper installation
	c. Pistons corroded in floating calipers	c. Remove and install, repair or replace floating caliper
Pulsating effect on brake pedal	 a. Wheel-bearing play excessive b. Brake disc not aligned with floating caliper c. Brake-disc runout d. Excessive thickness deviation within braking 	 a. Replace wheel bearings b. Check floating caliper installation c. Replace brake discs d. Measure brake disc thickness
	surface	Replace discs
Handbrake effect insufficient	a. Brake pad fouled by oilb. Excessive free playc. Corroded transmitting elements Replace discs	 a. Replace brake pads, determine cause b. Adjust handbrake c. Remove and install handbrake, check brake caliper,
		Bowden cables, replace if necessary check brake caliper, Bowden cables, replace if necessary

2007 TRANSMISSION Clutch - Repair Instructions - Cooper

2007 TRANSMISSION

Clutch - Repair Instructions - Cooper

00 MAINTENANCE AND INSPECTION

21 00 006 BLEEDING CLUTCH HYDRAULIC SYSTEM

Necessary preliminary tasks:

o Connect bleeder unit to brake fluid expansion tank.

IMPORTANT: Check relevant Operating Instructions for each device. Charging pressure should not exceed 2 bar.

Remove dust cap from bleed valve.

Connect bleeder hose to bleed valve (1).

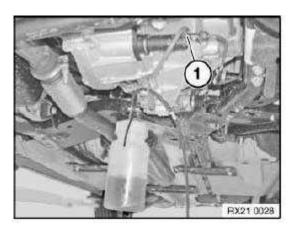


Fig. 1: Bleed Valve Courtesy of BMW OF NORTH AMERICA, INC.

Open bleed valve (1) and flush until clear brake fluid emerges without air bubbles.

Close bleed valve.

Switch off bleeder unit or remove from expansion tank.

Correct brake fluid level in expansion tank.

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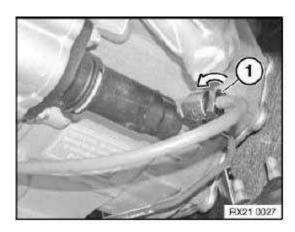


Fig. 2: Opening Bleed Valve Courtesy of BMW OF NORTH AMERICA, INC.

21 CLUTCH WITH DRIVING DISC

21 21 500 REMOVING AND INSTALLING OR REPLACING CLUTCH

Special tools required:

- 11 9 590 PLUG MANDREL
- 21 2 290 CLUTCH CENTERING TOOL
- 21 6 110

Necessary preliminary tasks:

Remove transmission, see 23 00 026 REMOVING AND INSTALLING TRANSMISSION (GS6-55BG).

Lock flywheel with special tool 11 9 590.

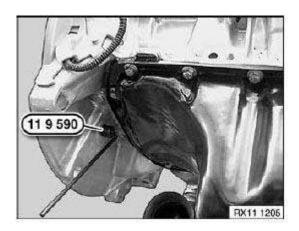


Fig. 3: Special Tools (11 9 590) Courtesy of BMW OF NORTH AMERICA, INC.

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Slacken bolts uniformly.

Unscrew bolts.

Remove pressure plate and clutch plate.

Clean flywheel and check for wear and damage.

If necessary, replace flywheel, see <u>11 22 500 REMOVING AND INSTALLING OR REPLACING FLYWHEEL (N12)</u>.

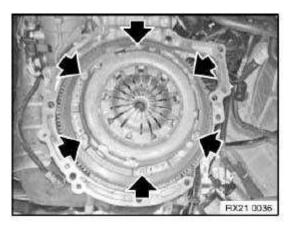


Fig. 4: Locating Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Check clutch plate for damage and friction rust, replace if necessary.

Replace contaminated clutch plate (oil, cleaning agent etc.).

NOTE: Direction marking GEARBOX SIDE (1) for transmission side of clutch plate.

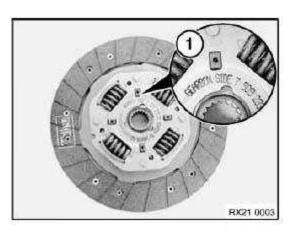


Fig. 5: Mark On Gearbox Side For Transmission Side Of Clutch Plate Courtesy of BMW OF NORTH AMERICA, INC.

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Check clutch disk for wear.

Measure lining protrusion on transmission side.

Measure from rivet head (1).

The clutch plate must be replaced if the lining clearance at the rivet head (1) is less than 1 mm.

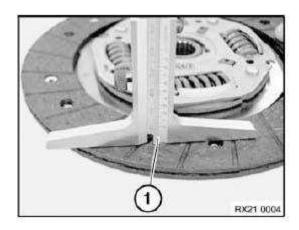


Fig. 6: Measuring Lining Protrusion On Transmission Side Courtesy of BMW OF NORTH AMERICA, INC.

Install pressure plate and clutch plate with special tool.

N12 with GS655BG: 21 2 290

N14 with GS653BG: 21 6 110



Fig. 7: Special Tools (21 2 290)
Courtesy of BMW OF NORTH AMERICA, INC.

Replace bolts of pressure plate and tighten down in sequence (1-6).

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Installation:

Turn centering mandrel 21 2 290 outwards in stages when tightening down pressure plate. Pressure plates must not touch centering mandrel.

Tightening torque: 21 21 4AZ, see 21 21 CLUTCH PLATE AND DRIVE PLATE.

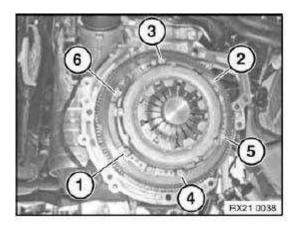


Fig. 8: Tightening Sequence Of Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Turn special tool 21 2 290 when tightening down the pressure plate in order to

center the clutch plate better. Remove special tool 11 9 590 . Remove special tool 21 6 110.

51 CLUTCH RELEASE CONTROLLER W/ LEVER

21 51 500 REMOVING AND INSTALLING OR REPLACING CLUTCH RELEASE UNIT

Necessary preliminary tasks:

• Transmission removed, see 23 00 026 REMOVING AND INSTALLING TRANSMISSION (GS6-55BG)

When installing a new clutch, you must also replace the release bearing.

Press spring wire clip (1) through clutch release lever (2).

Remove clutch release lever (2).

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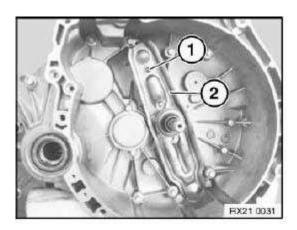


Fig. 9: Spring Wire Clip And Clutch Release Lever Courtesy of BMW OF NORTH AMERICA, INC.

Press in retainers (1) slightly and remove clutch release bearing.

Installation:

Clean all sliding surfaces on clutch release bearing.

Check for damage and replace if necessary.

Do not grease clutch release lever.

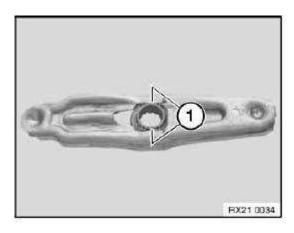


Fig. 10: Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spring wire clip (1) and ball pin (2) for damage and replace if necessary.

Remove spring wire clip (1).

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Lightly grease ball pin (2).

Clean sliding surface of guide sleeve (3).

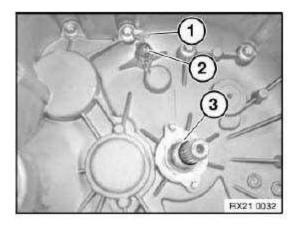
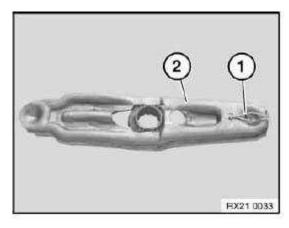


Fig. 11: Spring Wire Clip, Ball Pin And Guide Sleeve Courtesy of BMW OF NORTH AMERICA, INC.

Install spring wire clip (1) in release lever (2).

Install clutch release lever.



<u>Fig. 12: Spring Wire Clip And Release Lever</u> Courtesy of BMW OF NORTH AMERICA, INC.

52 CLUTCH OPERATION (HYDRAULIC)

21 52 010 REMOVING AND INSTALLING OR REPLACING CLUTCH SLAVE CYLINDER

NOTE: After completing work bleed clutch hydraulic system, see <u>21 00 006 Bleeding</u> <u>clutch hydraulic system</u>.

Draw off brake fluid until level is below connection to clutch master cylinder.

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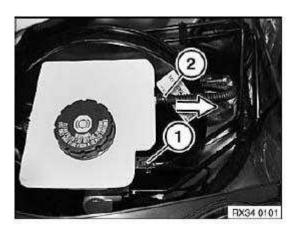


Fig. 13: Drawing Off Brake Fluid Courtesy of BMW OF NORTH AMERICA, INC.

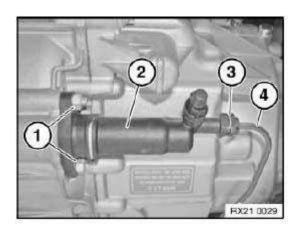
Release nuts (1) of clutch slave cylinder.

Remove clutch slave cylinder (2).

Release line connection (3) and disconnect line (4).

Tightening torque: 21 52 2AZ, see 21 52 CLUTCH CONTROL (HYDRAULIC).

IMPORTANT: Catch escaping brake fluid in a suitable container.



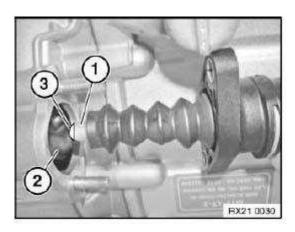
<u>Fig. 14: Nuts, Clutch Slave Cylinder, Line Connection And Line</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean thrust member (1) and contact face on release lever (2).

Lightly grease thrust member (1) on contact face (3).

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<u>Fig. 15: Thrust Member, Release Lever And Contact Face</u> Courtesy of BMW OF NORTH AMERICA, INC.

21 52 500 REMOVING AND INSTALLING OR REPLACING CLUTCH MASTER CYLINDER

Necessary preliminary tasks:

• Remove bearing block for foot pedal, see <u>35 11 000 REMOVING AND INSTALLING COMPLETE</u> <u>BEARING BLOCK FOR FOOT PEDAL</u>

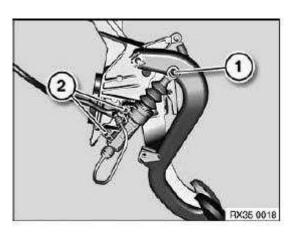
Press pin (1) together and press out.

Release nuts (2) and remove clutch master cylinder.

Tightening torque: 21 52 3AZ, see 21 52 CLUTCH CONTROL (HYDRAULIC).

IMPORTANT: After completing tasks

Bleed clutch hydraulic system, see 21 00 006 Bleeding clutch hydraulic system.



<u>Fig. 16: Pin And Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

ACCESSORIES & EQUIPMENT

Convertible Top - Repair - Cooper

REMOVING AND INSTALLING/REPLACING REAR WINDOW

NOTE: The rear window is replaced complete with the **Convertible Top Fabric**.

BACKFITTING CONVERTIBLE TOP WITH STOWAGE LOCK (FROM 09/2005)

Special tools required:

• 54 3 180

NECESSARY PRELIMINARY TASKS

- Remove complete convertible top
- Secure convertible top on convertible top mounting

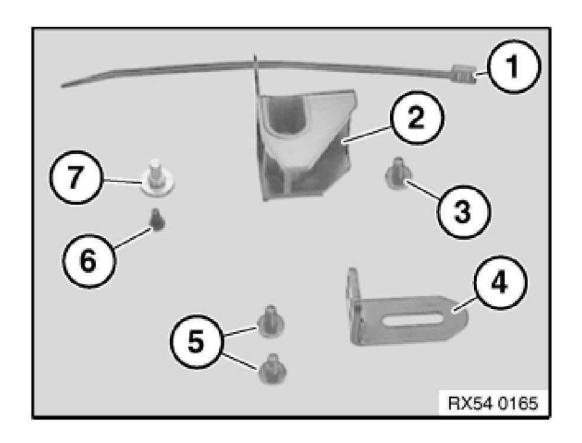
INSTALLATION

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must **not** be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

OVERVIEW OF BACKFITTING KIT

- 1. Cable strap
- 2. Stowage centering (without lock)
- 3. Screw for stowage centering
- 4. Bracket stowage centering
- 5. Screws for stop
- 6 Screw for Hall sensor
- 7. Stop for Hall sensor

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 1: Backfitting Kit Components</u> Courtesy of BMW OF NORTH AMERICA, INC.

Cover convertible top frame.

Chips must **not** get into the mechanism.

Saw off pin (1) from collar with hand saw.

IMPORTANT: Do not flex. Risk of damage!

Deburr collar with file.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

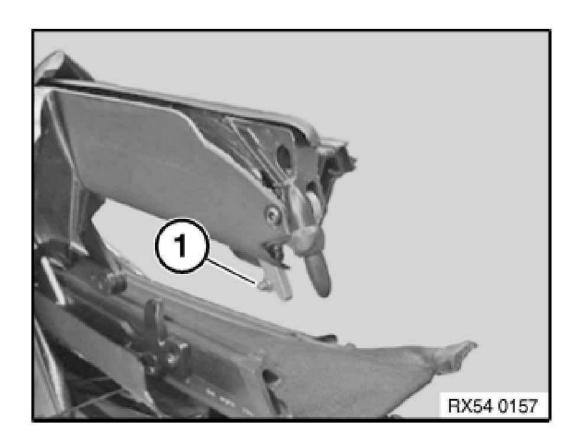


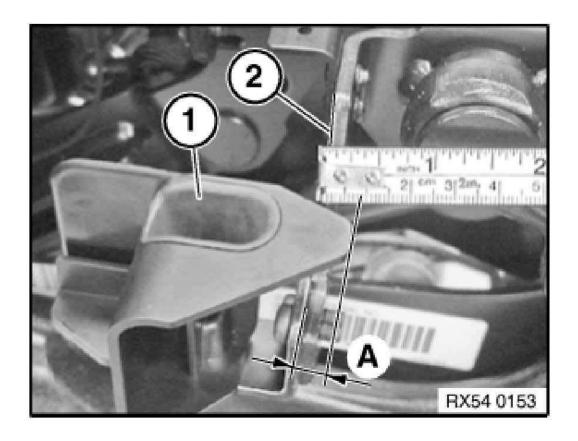
Fig. 2: Pin Courtesy of BMW OF NORTH AMERICA, INC.

Measure gap A between stowage lock (1) and main bearing (2). Note down gap A.

INSTALLATION

Adjust stowage without lock to gap A and screw down.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



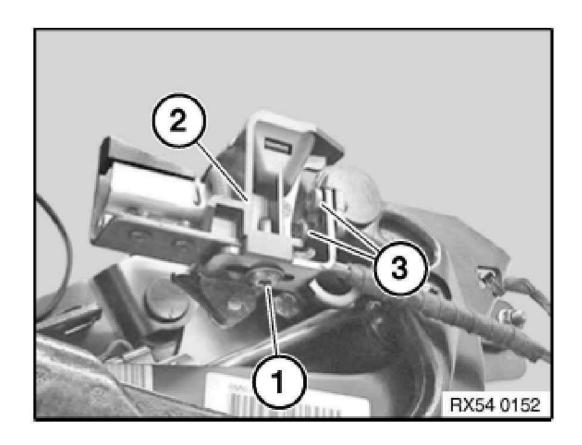
<u>Fig. 3: Measuring Gap A Between Stowage Lock And Main Bearing</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove stowage lock (2).

Release screws (3) and angle.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 4: Removing Stowage Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

Mount convertible top on special tool 54 3 180 and move with adapter cable until Hall sensor 5 is accessible.

See **CONVERTIBLE TOP TAKE-UP FIXTURE**.

Release clip (1) from main bearing.

Release fabric tape (2) from clip.

Remove clip.

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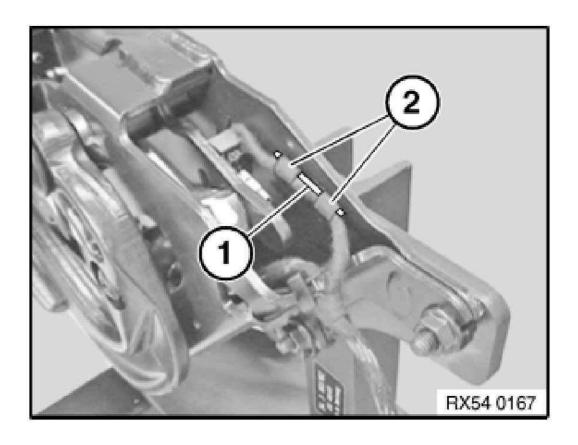
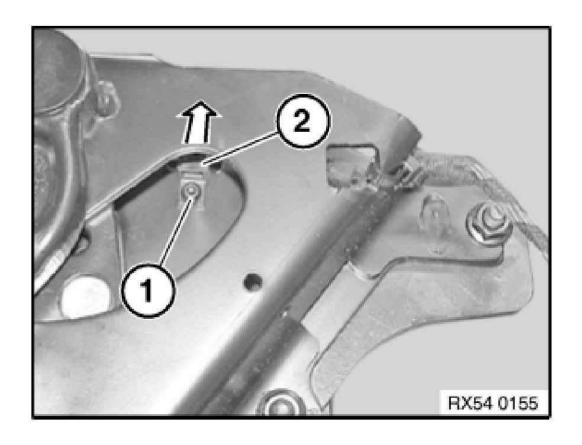


Fig. 5: Releasing Clip From Main Bearing Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and feed Hall sensor (2) out of main bearing in upward direction.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 6: Removing Screw And Feed Hall Sensor Out Of Main Bearing</u> Courtesy of BMW OF NORTH AMERICA, INC.

Insert stop screw (3) for Hall sensor into main bearing.

Check that Hall sensor (4) is flush with edge of main bearing (2).

Insert screw (1) with Loctite and tighten down.

IMPORTANT: Hall sensor must not turn when it is tightened down.

Check again that Hall sensor is flush.

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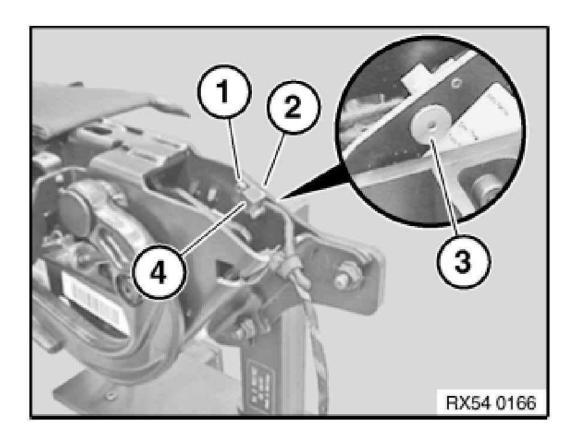
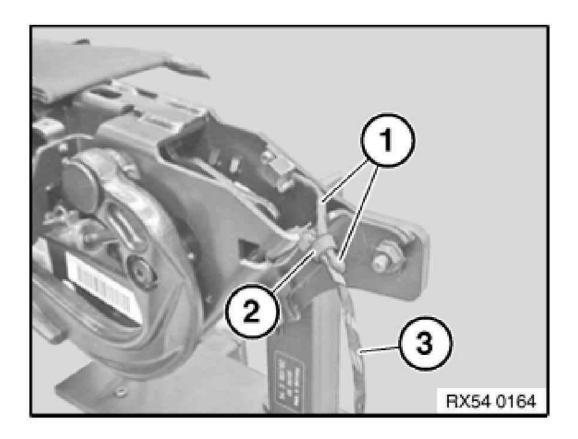


Fig. 7: Inserting Stop Screw For Hall Sensor Into Main Bearing Courtesy of BMW OF NORTH AMERICA, INC.

Reposition cable loom (1) and secure to main wiring harness (3) with fabric adhesive tape (2) or cable strap.



<u>Fig. 8: Positioning Cable Loom And Securing To Main Wiring Harness With Fabric Adhesive Tape</u> Courtesy of BMW OF NORTH AMERICA, INC.

EMERGENCY RELEASE OF CONVERTIBLE TOP FASTENER IN EVENT OF FAULTY FOLDING SUNROOF DRIVE CABLE

IMPORTANT: If the drive cables are torn, it is no longer possible to effect emergency release of the retaining hooks via the folding sunroof drive unit.

Always conduct convertible top movements with the assistance of a second person (risk of damage).

Make sure force is always exerted uniformly to the convertible top sides otherwise the frame will be bent.

NECESSARY PRELIMINARY TASKS

- Remove Convertible Top Drive Unit.
- Open complete side windows

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UNLOCKING RETAINING HOOKS

Raise rotary latch (1) on left and right with plastic wedge or similar from striker and slide back.

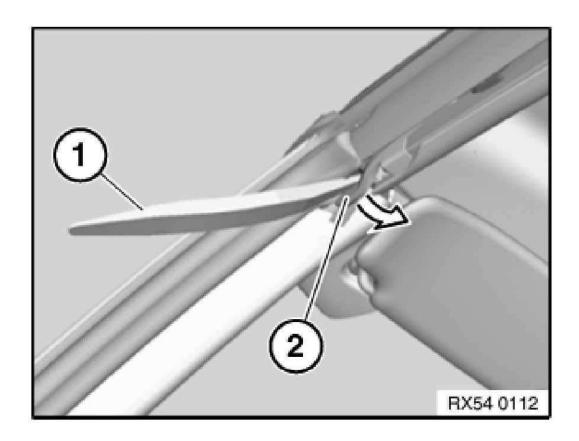
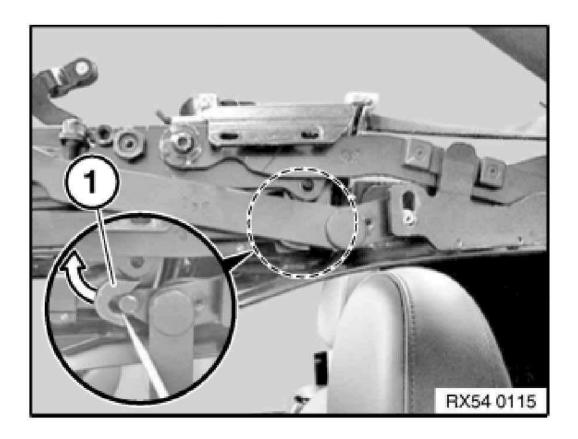


Fig. 9: Raising Rotary Latch On Left And Right Courtesy of BMW OF NORTH AMERICA, INC.

RELEASING CONVERTIBLE TOP FRAME AND ROOF CROSSBAR

• Lever out locking hook (1) between front and middle seals with screwdriver.

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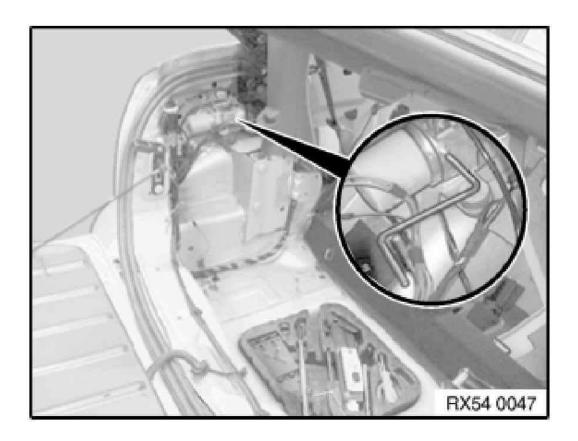


<u>Fig. 10: Releasing Locking Hook Between Front And Middle Seals With Screwdriver</u> Courtesy of BMW OF NORTH AMERICA, INC.

OPENING SHUT-OFF VALVE

• Open shut-off valve for emergency opening at hydraulic line with offset Allen key by one and a half turns.

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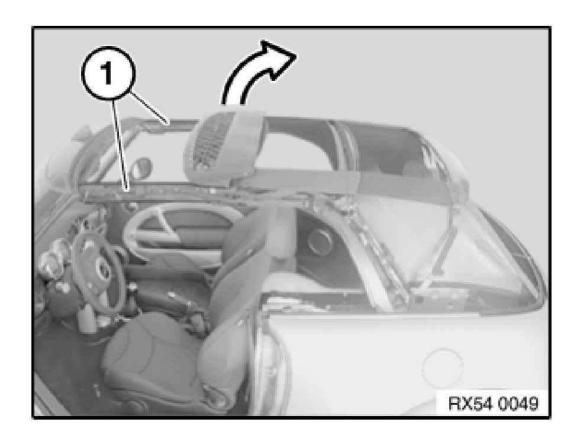


<u>Fig. 11: Opening Shut-Off Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

STOWING CONVERTIBLE TOP BY HAND

- Contact points at guide rails (1).
- Raise front bow.
- Fold convertible top and stow on stowage shelf.
- If necessary, close shut-off valve for emergency opening again to secure convertible top in end position.

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<u>Fig. 12: Contact Points At Guide Rails</u> Courtesy of BMW OF NORTH AMERICA, INC.

FURTHER WORK STEP

• Replace **faulty pitch cables** of folding sunroof

CONVERTIBLE TOP (SPECIAL TOOL - CONVERTIBLE TOP HOLDERS)

Special tools required:

- 00 2 030
- 54 3 180
- 54 3 201
- 61 2 071
- 61 2 080
- 61 2 090

WARNING: You are exposed to the risk of trapping body parts when working on the

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

installed or removed convertible top.

POSITIONING REMOVED CONVERTIBLE TOP

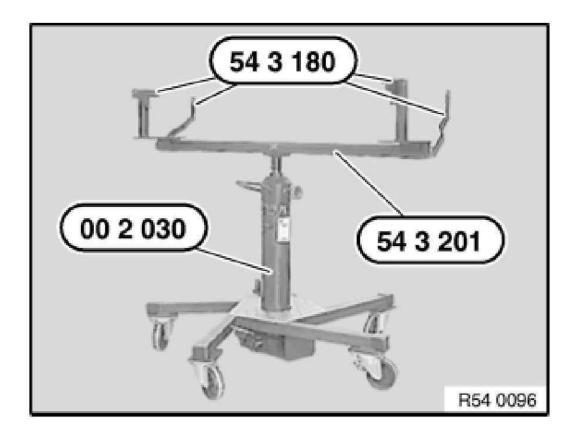
Mount convertible top holders 54 3 180 on support tube 54 3 201 and fit on universal lifter 00 2 030.

IMPORTANT: Use special tools only in conjunction with universal lifter 00 2 030.

There is a risk of tilting over if other lifting equipment is used.

Play convertible top on both sides on threaded bolts and secure with original nuts.

If necessary, lay hydraulic unit on special tool rest.



<u>Fig. 13: Mounting Convertible Top Holders On Support Tube</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to cables and hydraulic lines when fitting convertible top.

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Cables/lines must not be trapped.

CLOSING CONVERTIBLE TOP MANUALLY OR ELECTRICALLY

Always move the **convertible top manually** with a 2nd person helping (risk of damage).

Make sure force is always exerted uniformly to the convertible top sides otherwise the frame will be bent.

IMPORTANT: Avoid extended actuation of convertible top against end points (overflow function of hydraulic system).

Do not carry out more than 10 operations in 1 hour (then allow to cool down for approx. 1 hour).

Connect Adapter Cable

- o Folding roof and catch check: connect power supply cable **61 2 071** and adapter cable **61 2 090** for activating convertible top catch to white plug.
- o Convertible top check: connect power supply cable **61 2 071** and adapter cable **61 2 080** for activating hydraulic pump to black plug.

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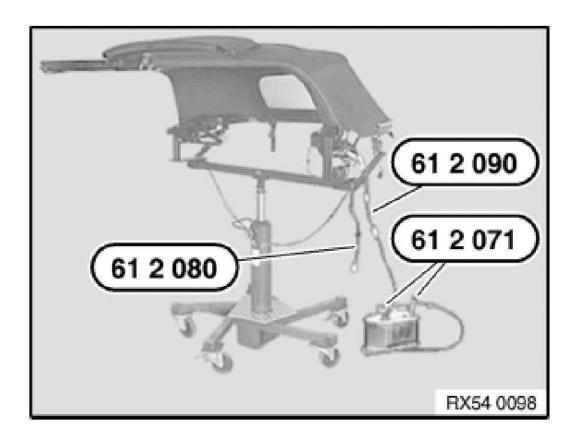


Fig. 14: Connecting Power Supply Cable And Adapter Cable Courtesy of BMW OF NORTH AMERICA, INC.

OPENING AND CLOSING LOADING AID (EASYLOAD)

NECESSARY PRELIMINARY TASKS

- Open rear lid.
- Unlock convertible top at rear

Set tension bar lock (1) on left/right down on rear lid striker (2).

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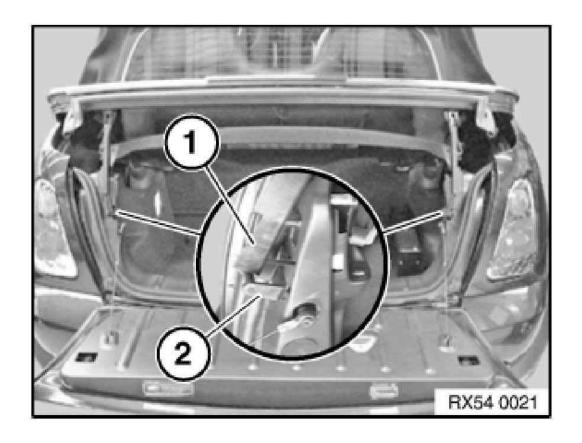
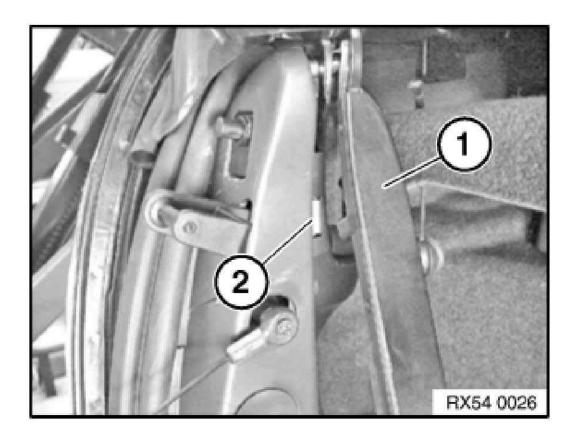


Fig. 15: Setting Tension Bar Lock On Left/Right Down On Rear Lid Striker Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Tension bar lock (1) must press on switch for convertible top/tension bar (2) (convertible top operation not functioning).

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<u>Fig. 16: Tension Bar Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

OVERVIEW OF MICROSWITCHES

- 1. Stowage shelf
- 2. Tension bar

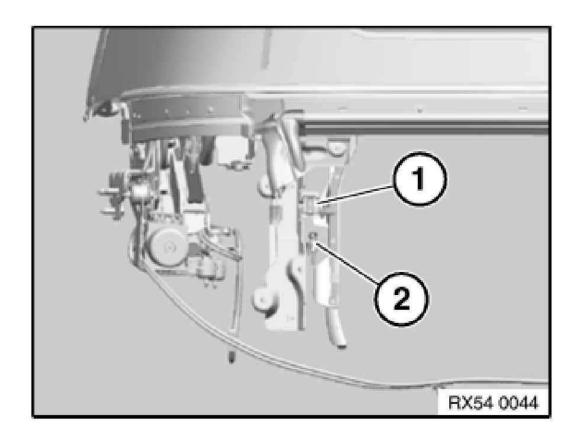


Fig. 17: Microswitch Components
Courtesy of BMW OF NORTH AMERICA, INC.

OPENING/CLOSING CONVERTIBLE TOP IN EVENT OF A TECHNICAL FAULT

IMPORTANT: Always conduct convertible top movements with the assistance of a second person (risk of damage).

Make sure force is always exerted uniformly to the convertible top sides otherwise the frame will be bent.

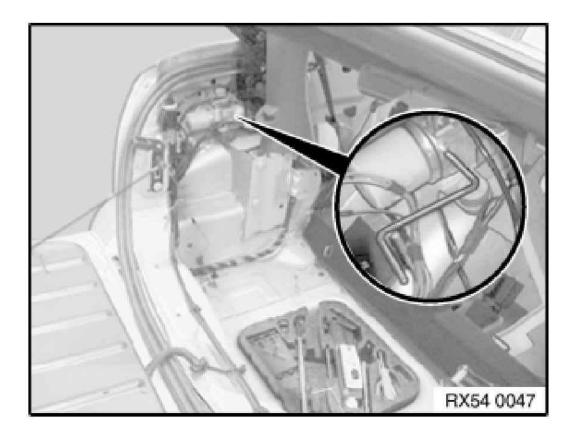
NECESSARY PRELIMINARY TASKS

- Check convertible top function problems
- Front doors must be permanently opened
- Lower rear side windows fully

OPENING SHUT-OFF VALVE

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• Open shut-off valve for emergency opening at hydraulic line with offset Allen key by one and a half turns.

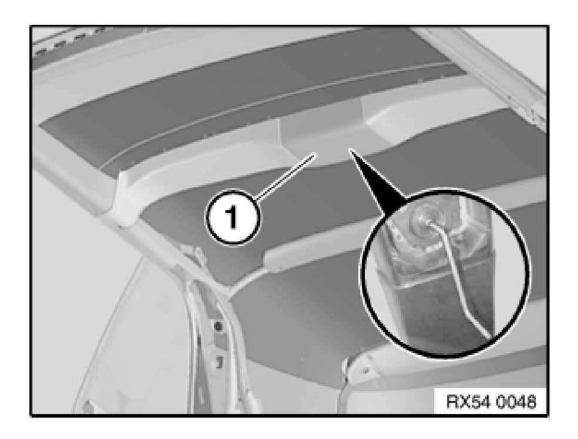


<u>Fig. 18: Opening Shut-Off Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

UNLOCKING RETAINING HOOKS

- Lever out roof crossbar cover (1) with plastic wedge.
- Insert offset hexagon socket and strike attachment with ball of hand until coupling can be felt to snap into place.
- Unlock retaining hooks completely by turning counterclockwise.
- If necessary, refit cover (1).

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<u>Fig. 19: Releasing Roof Crossbar Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

STOWING CONVERTIBLE TOP BY HAND

- Contact points at guide rails (1).
- Raise front bow.
- Fold convertible top and stow on stowage shelf.
- If necessary, close shut-off valve for emergency opening again to secure convertible top in end position.

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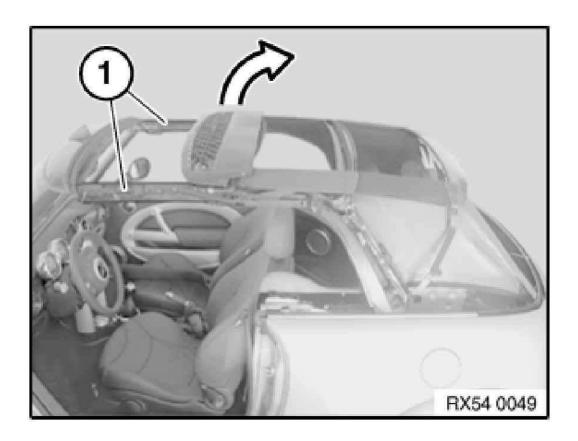


Fig. 20: Contact Points At Guide Rails
Courtesy of BMW OF NORTH AMERICA, INC.

CLOSING CONVERTIBLE TOP BY HAND

- Open shut-off valve on hydraulic unit.
- Lift convertible top by guide rails (1) off stowage shelf.
- Tension convertible top.
- Lock retaining hooks on cowl panel.
- Refit cover.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

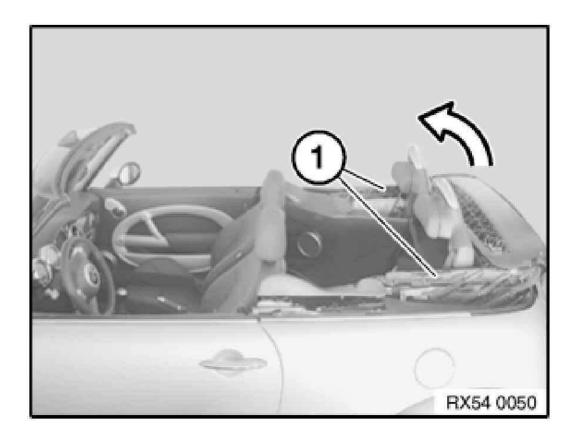
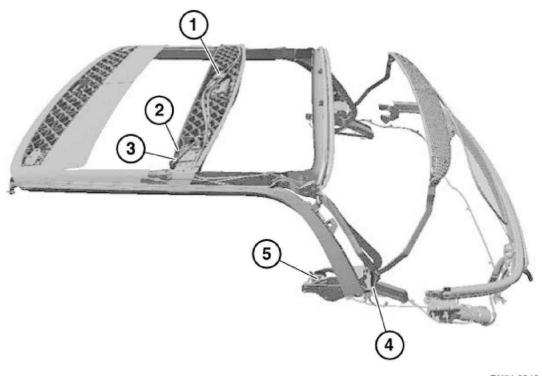


Fig. 21: Lifting Convertible Top By Guide Rails Courtesy of BMW OF NORTH AMERICA, INC.

OVERVIEW OF HALL SENSORS IN CONVERTIBLE TOP

NOTE: Various Hall sensors provide constant information on the position of the folding roof and convertible top.

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RX54 0043

Hall sensors:

- 1 Roof crossbar, right
- 2 Roof crossbar, left
- 3 Roof crossbar, left
- 4 Main bearing
- 5 Main bearing

Description:

Folding roof closed

Folding roof fully opened

Retaining hooks opened or closed

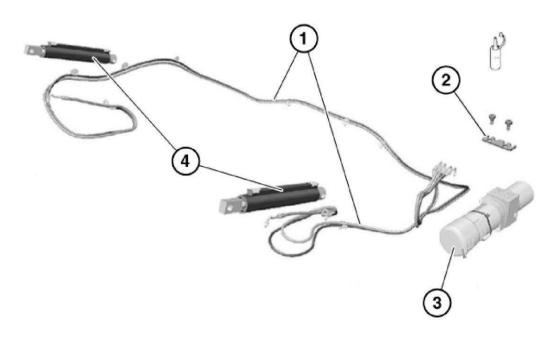
Convertible top fully stowed

Convertible top fully raised

<u>Fig. 22: Overview Of Hall Sensors In Convertible Top</u> Courtesy of BMW OF NORTH AMERICA, INC.

OVERVIEW OF HYDRAULIC CONVERTIBLE TOP COMPONENTS

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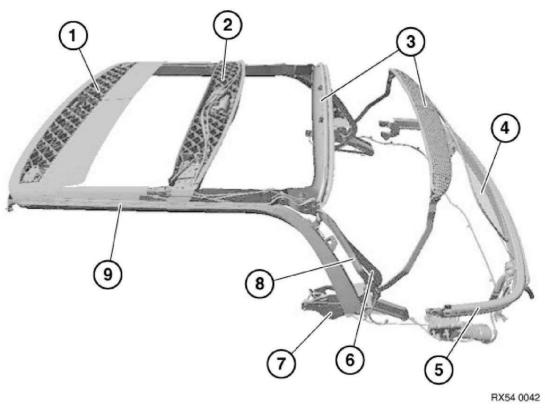
- 1 Hydraulic lines
- 2 Fastening set, hydraulic lines

- 3 Hydraulic unit
- 4 Hydraulic cylinders, main pillar

Fig. 23: Hydraulic Convertible Top Components Courtesy of BMW OF NORTH AMERICA, INC.

OVERVIEW OF MECHANICAL CONVERTIBLE TOP COMPONENTS

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1	Front bow	6	Main link
2	Roof crossbar	7	Main bearing
3	Bow	8	Main pillar
4	Rear window	9	Guide rail

Fig. 24: Mechanical Convertible Top Components Courtesy of BMW OF NORTH AMERICA, INC.

REMOVING AND INSTALLING MAIN BOW PANEL

Unfasten screws.

5

Unclip panel from main bow.

Tension bar

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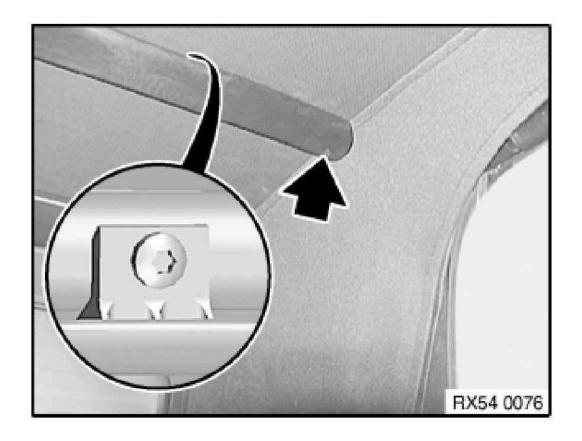


Fig. 25: Unclipping Panel From Main Bow Courtesy of BMW OF NORTH AMERICA, INC.

REPAIR INSTRUCTIONS FOR CONVERTIBLE TOP HYDRAULIC SYSTEM

1. DEFINITIONS OF TERMS

DEFINITIONS OF TERMS CHART

Hydraulic system (untensioned state):	• I uili igiiitioii iock to o	Short circuit in hydraulic system Observe Point 3
	 Convertible top slowly collapses in extreme position under its own weight 	
	 Open shut-off valve for emergency opening 	
Mechanical actuation: Emergency actuation:	 Convertible top is opened or closed by hand 	Observe Point 3
	 Always move convertible 	

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	top with aid of a second person	
Closed system:	All lines are connected	
Function Test:	• Open and close convertible top several times (min. 3 times)	
	Check can be carried out on convertible top while removed	
	Check fluid level in hydraulic unit; if necessary, top up fluid	
Convertible top stowed:	Convertible top fully open (folded together)	When convertible top is installed, it rests on the stowage shelf

2. WHEN WORKING ON HYDRAULIC SYSTEM, OBSERVE THE FOLLOWING

o After it has been removed, the convertible top must be safely set down or spread out.

The **special tool** must be used.

The universal lifter is absolutely required here.

• When the hydraulic system is open (unscrewing of lines, topping up of fluid, etc.), always provide sufficient cloths to catch leak-off fluid.

Also provide an adherent protective cover to cover/protect fittings.

- When opening the hydraulic system, make absolutely sure that no dirt, dust or chips can get into the hydraulic circuit.
- o Disconnect feed and return lines if possible at a later stage, when the convertible top is stowed and untensioned (Check fluid, see also **POINT 3**).
- Once the hydraulic system has been opened, first check the fluid level after completing the tasks before carrying out a function test.
- o After disconnecting the hydraulic lines from hydraulic components, do not move the convertible top if at all possible (fluid can escape from joints).
- o Piston rods must not be damaged (e.g. scratches). Even paint mist and welding spots are harmful.

When working in the vicinity of hydraulic cylinders, cover the cylinders with suitable materials.

o If the hydraulic unit or the lines stay removed for an extended period of time, the bores on the hydraulic unit and the hose connections must be sealed off.

3. MECHANICAL CONVERTIBLE TOP OPERATION

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- o Open shut-off valve for emergency opening on hydraulic unit.
- o Lower side windows at front slightly and at rear completely.
- o Convertible top emergency operation.
- In the event of repeated actuation, the system fluid is pumped into the supply tank of the hydraulic unit. If hydraulic components are now replaced, there will be too much fluid in the system. This may cause damage to the system in event of actuation. (Checking fluid level, see <u>POINTS 4</u> and <u>5</u>).

4. CHECKING FLUID LEVEL

- When the convertible top is closed.
- o Fluid level must be within the markings (circle/cross).
- o Fluid is supplied with the repair kits (e.g. banjo bolts/seals, hoses, cylinders) and is available separately.

5. TOPPING UP/EXTRACTING FLUID

- o the hydraulic fluid does not have to be changed because the system is filled with life-time fluid. Only the approved hydraulic fluid may be used in the event of leaks.
- o Follow brief instructions.
- o Remove hydraulic unit without detaching lines.
- o Fluid is supplied with the repair kits (e.g. banjo bolts/seals, hoses, cylinders) and is available separately.
- o Pour in fluid with bottle through filling orifice.
- o In the event of overfilling, allow the fluid to escape through the filling orifice and catch the fluid in a suitable container.

6. BLEEDING HYDRAULIC SYSTEM

 If there is a significant build-up of noise while the convertible top is moving, the convertible top must be opened and closed several times. The hydraulic system is automatically bled in the fluid reservoir in the process.

TOPPING UP/EXTRACTING FLUID, CHECKING FLUID LEVEL

NOTE: No changing of the hydraulic fluid necessary.

- o The hydraulic fluid does not have to be changed because the system is filled with life-time fluid.
- o Only the approved hydraulic fluid may be used in the event of leaks.
- o All hydraulic cylinders must be completely extended.
- o The hydraulic system is automatically bled by repeated actuation.

NECESSARY PRELIMINARY TASKS

• Remove hydraulic unit (hydraulic system closed)

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IMPORTANT: Protect components and work area with suitable materials (e.g. cloths).

TOPPING UP FLUID

Align hydraulic unit vertically.

Open fluid filler plug.

Pour in required amount of fluid from fluid bottle.

INSTALLATION

Check fluid level in the meantime.

EXTRACTING FLUID

Open fluid filler plug.

Tilt hydraulic unit and let fluid flow out or draw off with a suitable auxiliary apparatus.

CHECKING FLUID LEVEL

Fluid level must be within the markings (arrow) when the unit is horizontal.

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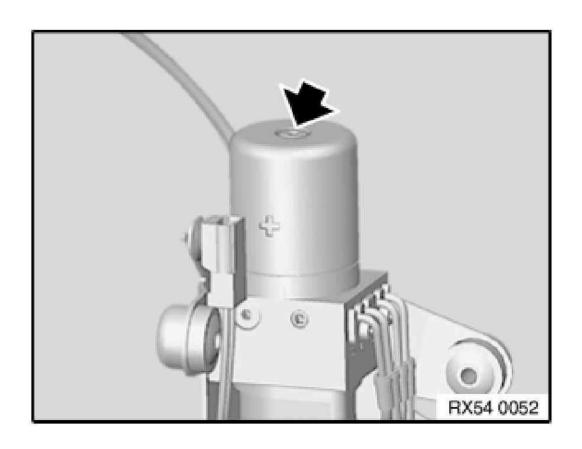
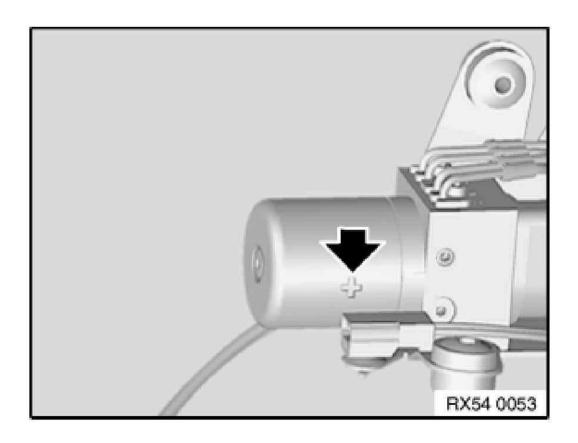


Fig. 26: Fluid Filler Plug Courtesy of BMW OF NORTH AMERICA, INC.

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<u>Fig. 27: Checking Fluid Level</u> Courtesy of BMW OF NORTH AMERICA, INC.

CHECKING FUNCTION OF EH CONVERTIBLE TOP

WARNING: You are exposed to the risk of trapping body parts when working on the installed or removed convertible top.

Convertible top is centered by pin (1) during insertion into guide (2) and locked by rotary latch (3).

Carefully close convertible top until rotary latch (3) has retracted by approx. 1/3 into striker.

Rotary latch (3) and pin (1) must close correctly and virtually silently.

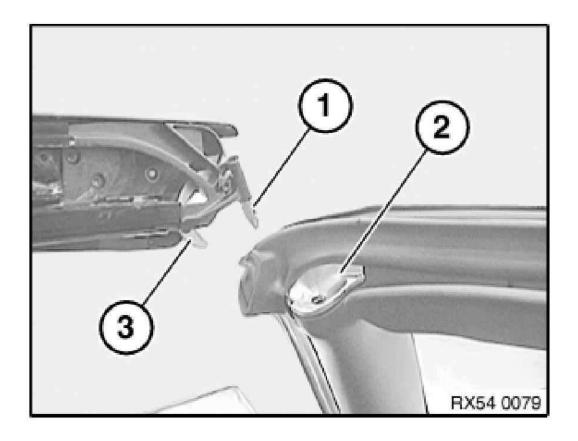
If necessary, adjust convertible top.

Open and close convertible top at least 3 times.

Check all line connections for fluid leaks.

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If necessary, check fluid level.



<u>Fig. 28: Convertible Top Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

FUNCTION CONDITIONS, FOLDING ROOF

Opening and closing of folding roof is only possible when:

- o battery voltage is sufficient, start engine if necessary
- o tension brackets are lowered and locked
- o speed does not exceed 120 km/h
- o outside temperature is between -10°C and +80°C
- o from ignition lock position "R" (radio setting)
- o control switch is pressed

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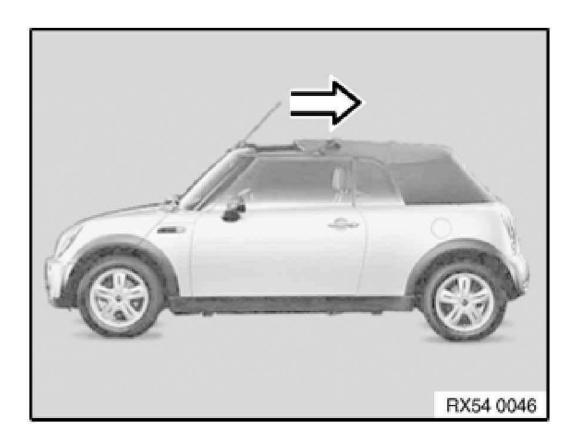


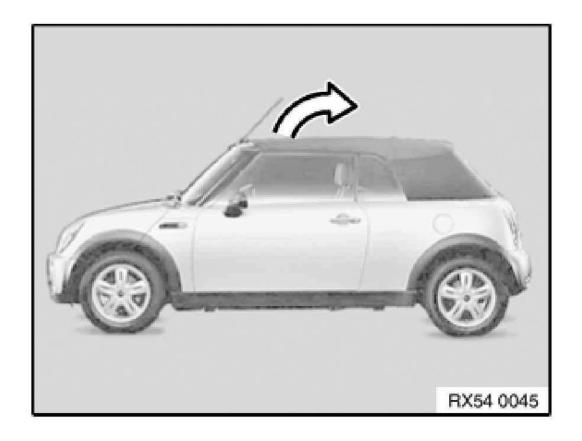
Fig. 29: Opening And Closing Of Folding Roof Courtesy of BMW OF NORTH AMERICA, INC.

FUNCTION CONDITIONS, CONVERTIBLE TOP

Opening and closing of convertible top is only possible when:

- o battery voltage is sufficient, start engine if necessary
- o folding roof is in proper working condition
- o rear side windows are lowered completely
- o front side windows are lowered slightly
- o tension brackets are lowered and locked
- o stowage shelf is engaged in lower position
- \circ speed does not exceed 4 km/h
- \circ outside temperature is between -10°C and +80°C
- o from ignition lock position "R" (radio setting)
- o hydraulic pump motor is not overheated
- o control switch is pressed

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<u>Fig. 30: Opening And Closing Of Convertible Top</u> Courtesy of BMW OF NORTH AMERICA, INC.

IN EVENT OF FUNCTION PROBLEMS

- Convertible top actuation in event of a technical fault
- Repair instructions hydraulic system

Only when you have excluded the function conditions as fault sources can you start convertible top diagnosis.

REMOVING AND INSTALLING/REPLACING HYDRAULIC UNIT FOR CONVERTIBLE TOP DRIVE

NECESSARY PRELIMINARY TASKS

- Open loading aid
- Remove left wheel arch trim

CAUTION: Hydraulic fluid may emerge from the disconnected lines and the open

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

connections on the hydraulic unit.

Protect components and work area with suitable materials (e.g. cloths).

Make sure that dirt cannot get into the hydraulic circuit.

Follow repair instructions for hydraulic system.

Do not fit hydraulic lines in kinked, crushed or transposed condition.

Unfasten screws.

Tightening torque 54 34 1AZ. See CONVERTIBLE TOP - TORQUE SPECIFICATIONS.

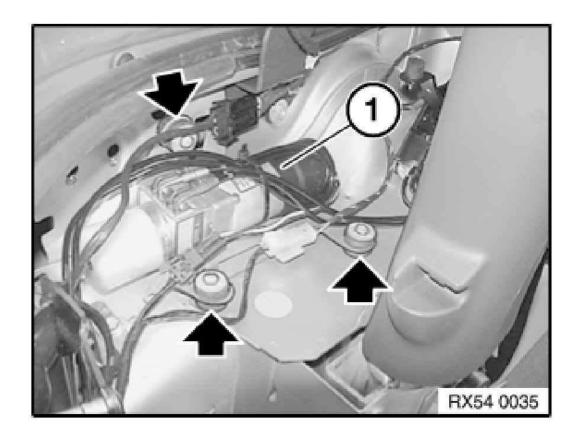
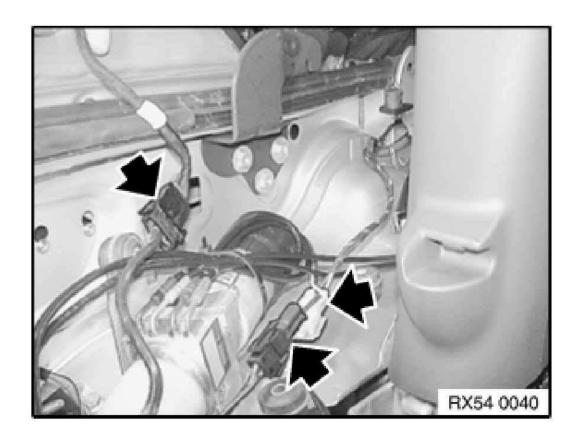


Fig. 31: Hydraulic Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections and disconnect.

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<u>Fig. 32: Hydraulic Pump Plug Connections</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Push up lockplate (2) in direction of arrow.

Detach hydraulic lines.

Remove hydraulic unit.

INSTALLATION

Hydraulic lines and connections are marked with numbers to prevent mix-ups.

Check **fluid level** or top up if necessary.

Fully open and close convertible top a minimum of 10 times in order to bleed the hydraulic system.

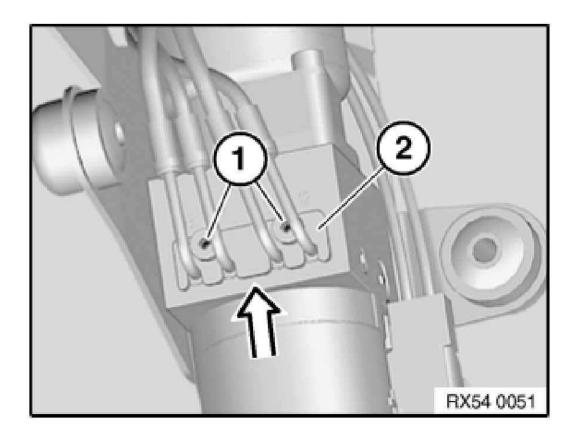


Fig. 33: Releasing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HYDRAULIC CYLINDER FOR CONVERTIBLE TOP

NECESSARY PRELIMINARY TASKS

- Remove EH convertible top
- Position EH convertible top on special tool and close

NOTE: The hydraulic cylinder is only accessible when the convertible top is removed and closed.

Make sure that dirt cannot get into the hydraulic circuit.

Disconnect all cable straps.

INSTALLATION

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Replace faulty cable straps.

Lever out retainer (1) and drive out pin (2).

Release grub screw in screw head (3).

Release screw (3).

Feed out hydraulic cylinder (4) towards bottom.

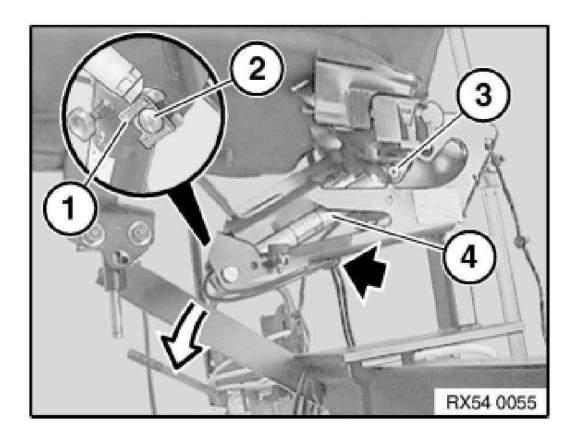


Fig. 34: Removing Retainer And Drive Out Pin Courtesy of BMW OF NORTH AMERICA, INC.

DISCONNECTING HYDRAULIC LINES FROM CYLINDER

Push open retainer (1) on cylinder with screwdriver.

Detach hydraulic lines (2).

IMPORTANT: Protect joints (lines and cylinder) against dripping fluid, e.g. with a cleaning

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cloth.

Observe hose markings.

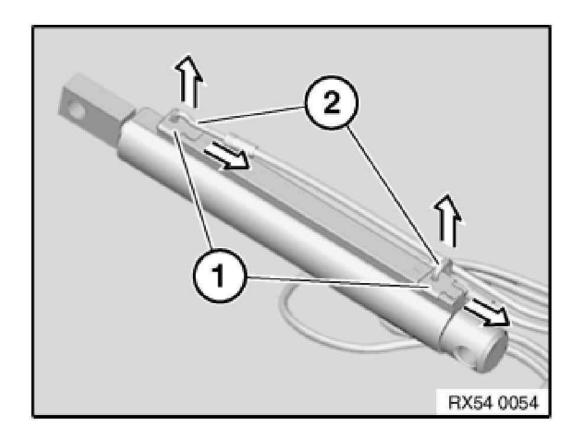


Fig. 35: Detaching Hydraulic Lines Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

Fully open and close convertible top approx. 10 times in order to bleed the system.

Check fluid level.

REMOVING AND INSTALLING/REPLACING COMPLETE HYDRAULIC SYSTEM FOR CONVERTIBLE TOP

NECESSARY PRELIMINARY TASKS

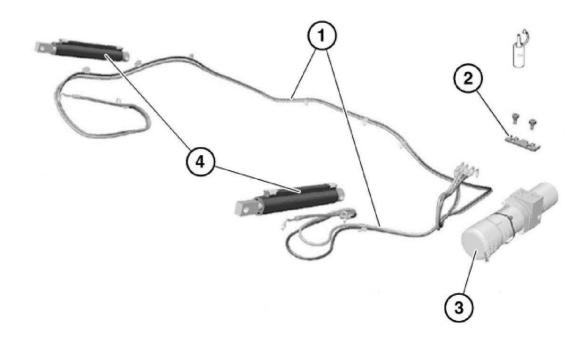
• Remove hydraulic cylinder from main bearing

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NOTE: Hydraulic circuit remains closed during this operation.

Do not kink or crush hydraulic lines.

OVERVIEW OF HYDRAULIC SYSTEM



RX54 0041

- 1 Hydraulic lines
- 2 Lockplate

- 3 Hydraulic unit
- 4 Hydraulic cylinders

Fig. 36: Overview Of Hydraulic System Courtesy of BMW OF NORTH AMERICA, INC.

ADJUSTING CONVERTIBLE TOP STOP SCREWS (CONVERTIBLE TOP COVER CHAFING)

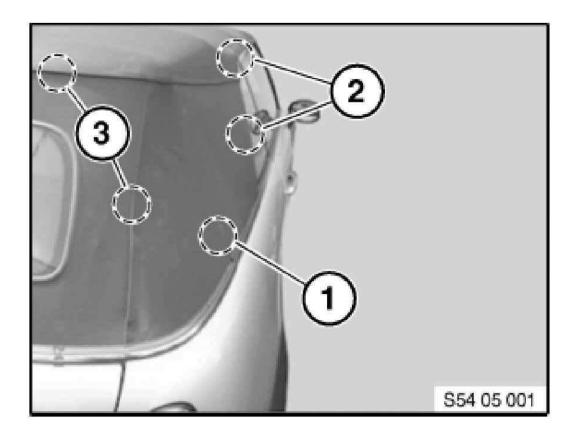
Special tools required:

- 54 3 191
- 54 3 192
- 54 3 193

NOTE: Adjustments serve to avoid chafing and pressure marks in the following areas of the convertible top cover:

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- 1. Area, C-pillar
- 2. Area, window cutout
- 3. Area, seam next to and above rear window



<u>Fig. 37: Pressure Marks Of Convertible Top Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

NECESSARY PRELIMINARY TASKS

- Measure gap A1 between top edge of stop screw (1) and top edge of main bearing (3).
- Note down measurement A1.

NOTE: Do not release lock nut (2) yet

- Remove rear seal on left and right "without seal carrier"
- Open convertible top fully and stow

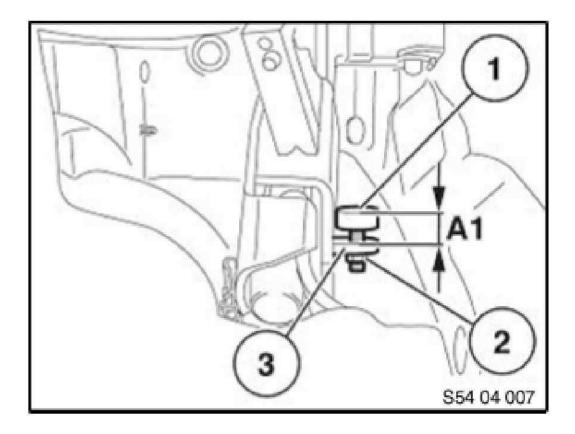
NOTE: The following operations must be carried out on the right side in the same way

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

as on the left side shown here!

Insert special tools 54 3 191 / 54 3 192 on left and right in seal carrier.

Insert locking pin (1) in second screw head (2) from rear.



<u>Fig. 38: Measuring Gap A1 Between Top Edge Of Stop Screw And Top Edge Of Main Bearing</u> Courtesy of BMW OF NORTH AMERICA, INC.

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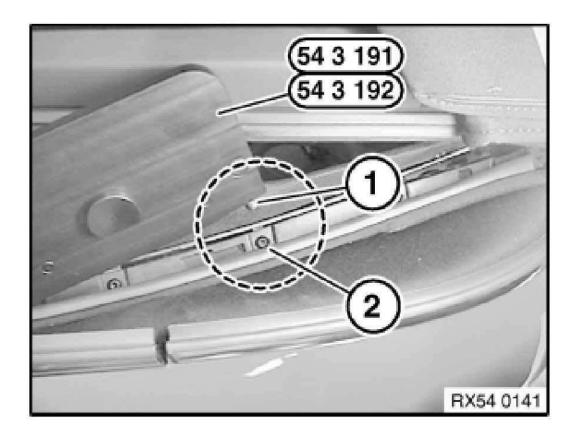


Fig. 39: Inserting Locking Pin In Second Screw Head Courtesy of BMW OF NORTH AMERICA, INC.

Special tool must not be able to move in seal carrier.

Check that special tool is correctly seated by moving back and forth sideways.

Special tool should ideally rest with its contact points (1) on seal carrier.

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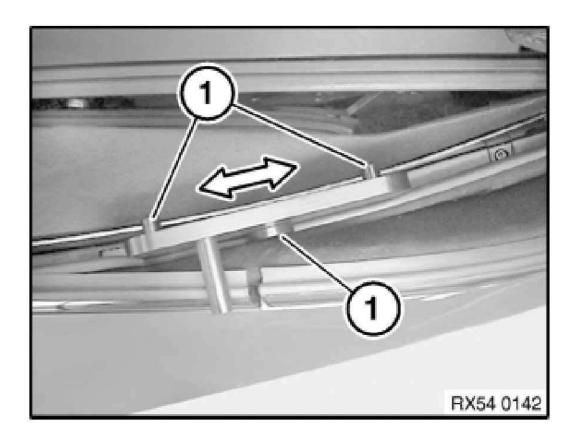


Fig. 40: Checking Special Tool Correctly Seated Courtesy of BMW OF NORTH AMERICA, INC.

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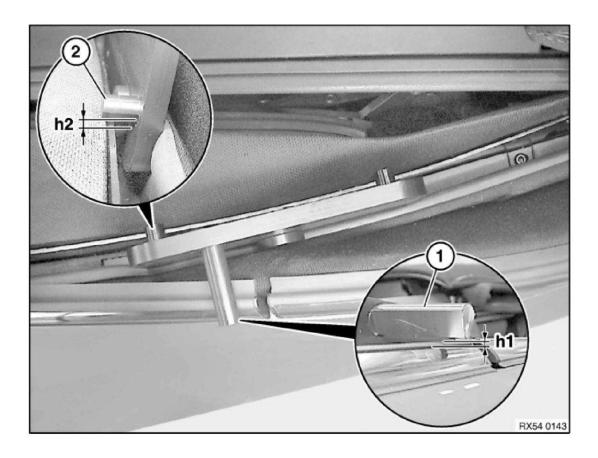


Fig. 41: Measuring Gap H2 Between Contact Journal And Seal Carrier And H1 Between Check Stop And Window Cavity Cover Strip Courtesy of BMW OF NORTH AMERICA, INC.

If the check stop (1) rests on the window cavity cover strip, the height h2 of the contact journal to the seal carrier must be checked.

If contact journal (2) does not rest on the seal carrier, the convertible top is adjusted too low.

- o Measure gap h2 between contact journal (2) and seal carrier with feeler gauge.
- o h2 = stop screw must be adjusted higher.

If the check stop (1) on the window cavity cover strip is higher than 3 mm, then the convertible top is set too high.

- o Measure gap h1 between check stop (1) and window cavity cover strip with feeler gauge.
- o h1 = adjust gap between 0 3 mm.

NOTE: Ideal adjustment is achieved when all contact journals (2) on the seal carrier and check stop (1) rest on the window cavity cover strip. h1 max. +3 mm.

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NOTE: To calculate the adjustment dimension, multiply the measured dimension by 1.5.

1.5 Transmission ratio of mechanism

=

Measured h1 or h2 = 2 mm

2 mm x 1.5 = Adjust 3 turns of lock nut in the relevant measured direction h1 or h2.

Set special tool 54 3 193 on lock nut and release.

Twist stop screw (1) out of main bearing.

NOTE: Stop screw is rendered stiff by Loctite, remove Loctite if necessary.

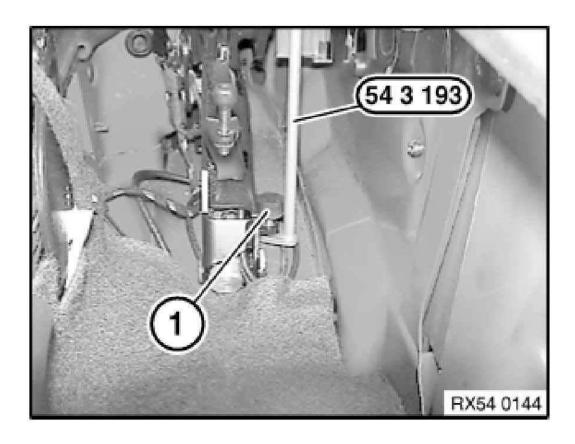


Fig. 42: Twisting Stop Screw Out Of Main Bearing Courtesy of BMW OF NORTH AMERICA, INC.

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Turn lock nut (1) on thread of stop screw and adjust noted-down measurement A1 from bottom edge of lock nut to top edge of stop.

NOTE: If necessary, use a new stop screw with a longer thread.

During installation, stop screw is no longer locked from below but rather from above.

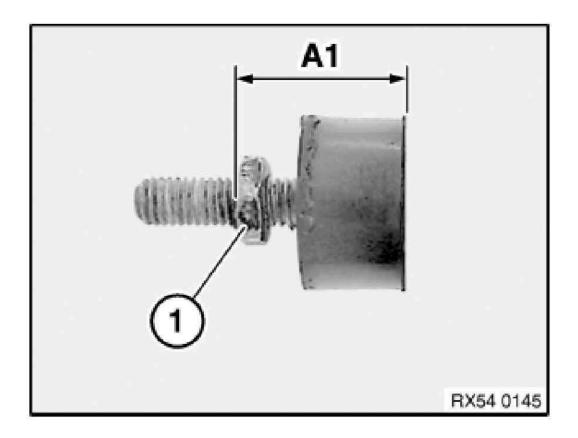


Fig. 43: Turning Lock Nut On Thread Of Stop Screw Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The measured dimension is not equal to the adjustment dimension

If e.g. a gap h2 is has been measured between check stop and window cavity cover strip, the lock nut must be adjusted by the calculated number of turns in direction h2.

- o Adjust number of turns
- Install and lock stop screw
- o Repeat procedure until adjustments are in the tolerance range

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Tolerance +0.5 mm between check stop and window cavity cover strip.

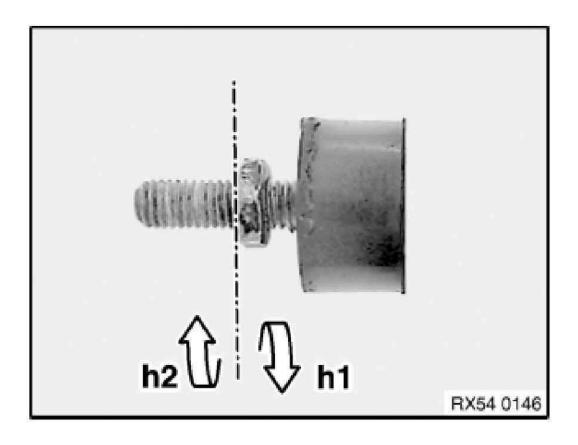


Fig. 44: Checking Tolerance Between Check Stop And Window Cavity Cover Strip Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle.

Carry out function check. See <u>Checking Function Of EH Convertible Top</u>.

54 34 100 ADJUSTING CONVERTIBLE TOP

NOTE: Observe body gap dimensions for ideal adjustment of convertible top in relation to body.

If necessary, remove side trim panel.

If necessary, remove cover on cowl panel. See $\underline{\text{BODY EQUIPMENT - REPAIR}}$ INSTRUCTIONS .

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

LONGITUDINAL ADJUSTMENT, MAIN BEARING

Slacken retaining screw (2) (do not release fully).

Insert nuts (1) and screw (3) (convertible top must still be movable).

Elongated holes in retaining plate allow longitudinal adjustment of the convertible top.

Close and lock convertible top.

Convertible top is secured and adjusted.

Check gap dimensions.

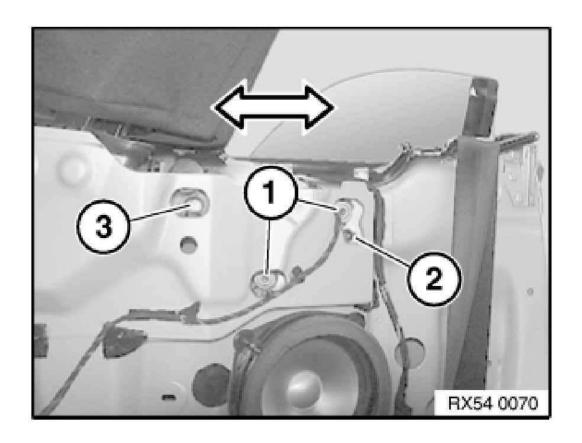
Tighten down retaining screw (2).

Tightening torque. See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

Tighten down nuts (1).

Tightening torque. See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 45: Inserting Nuts And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

LONGITUDINAL AND VERTICAL ADJUSTMENT, BEARING, TENSION BAR

Screw in nuts (1) until contact with screw heads (bearing must still be movable).

Elongated holes on tension bar bearing allow longitudinal and vertical adjustment of the convertible top.

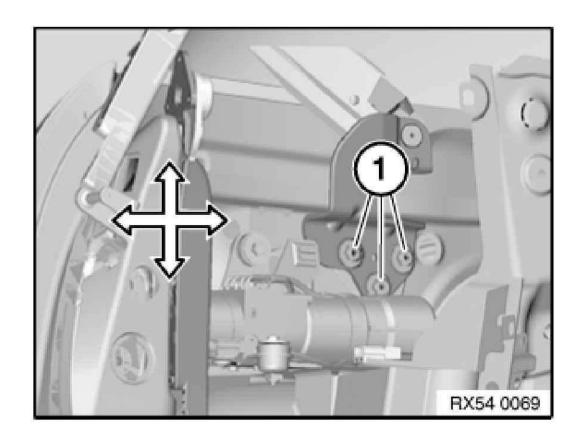
Close and lock loading aid.

Check gap dimensions and if necessary align.

Tighten down nuts (1).

Tightening torque See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 46: Tightening Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

VERTICAL AND LATERAL ADJUSTMENT, BASE PLATE (FRONT BOW)

Slacken screws (1) (do not release fully).

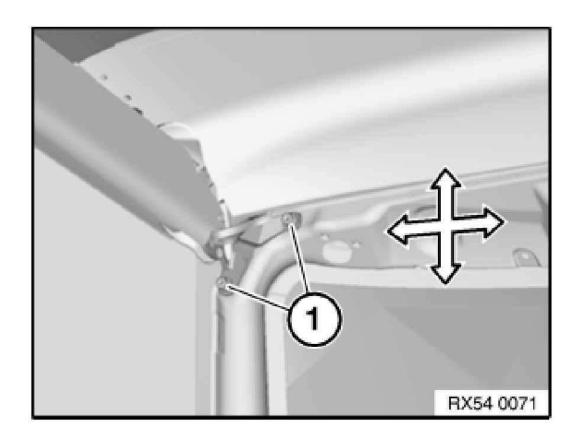
Elongated holes on base plate allow vertical and lateral adjustment of the convertible top.

Check gap dimensions and if necessary align.

Tighten down screws (1).

Tightening torque 54 34 3AZ. See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 47: Tightening Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

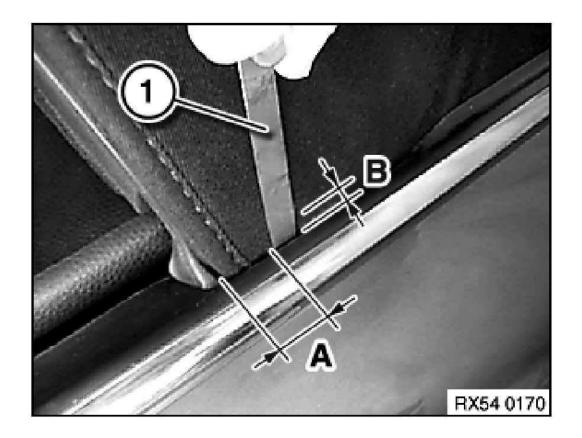
ADJUSTING GAP DIMENSION FOR C-PILLAR

Measure gap dimension with feeler gauge (1) between convertible top and seal (window cavity cover strip).

- A. At gap 20 mm
- B. Gap dimension between 0.5 2.5 mm

If gap dimension (B) is outside the tolerance, then the control rod must be replaced.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 48: Measuring Gap Dimension Between Convertible Top And Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

REPLACING CONTROL ROD

Partially open convertible top.

Unclip control rod.

Gap dimension 0.5 mm - install shorter control rod.

Gap dimension 2.5 mm - install longer control rod.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 49: Replacing Control Rod</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 101 REMOVING AND INSTALLING COMPLETE EH CONVERTIBLE TOP

NECESSARY PRELIMINARY TASKS

- Remove rear side trim panels
- Remove luggage compartment trim panels
- Remove panel for rear window shelf

REPLACEMENT UP TO BUILD DATE 09/2005 ONLY

Convertible top up to 09/2005 without stowage lock.

From build date 09/2005 convertible top will only be supplied with stowage lock.

New convertible top must be modified to old version before 09/2005.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Procedure is described in:

• Modifying convertible top with stowage lock

IMPORTANT: Risk of damage!

Open loading aid and tape off working area with adhesive tape (1) and cover rear end of car.

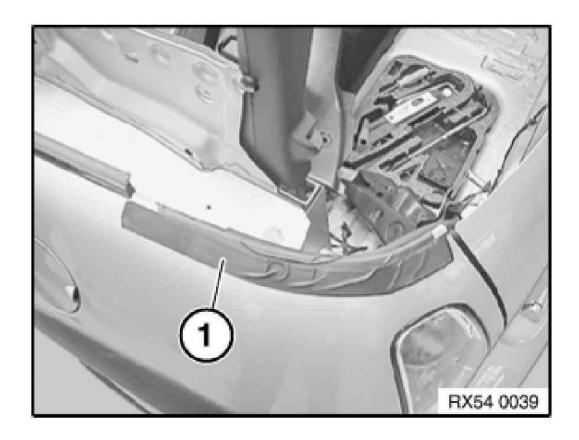


Fig. 50: Adhesive Tape Courtesy of BMW OF NORTH AMERICA, INC.

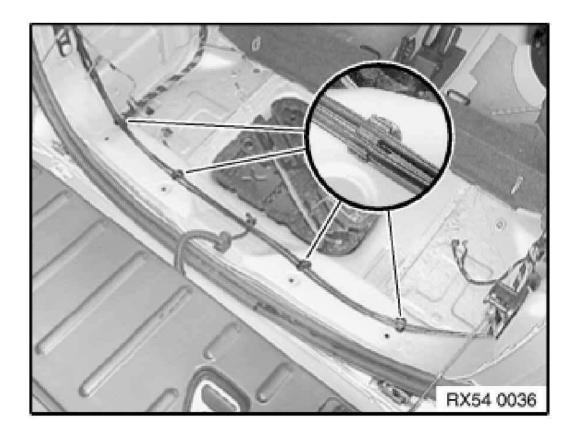
Unclip hydraulic lines.

INSTALLATION

If necessary, replace faulty clips.

Hydraulic lines must not be kinked or transposed.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



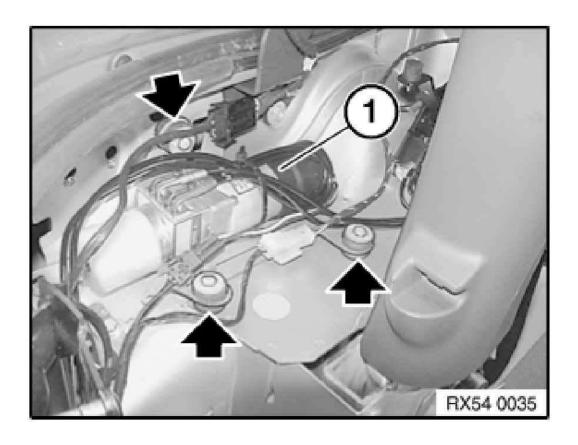
<u>Fig. 51: Uncliping Hydraulic Lines</u> Courtesy of BMW OF NORTH AMERICA, INC.

LEFT SIDE

Release screws of hydraulic unit (1).

Tightening torque **54 34 6AZ.** See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 52: Releasing Screws Of Hydraulic Unit</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections and disconnect.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

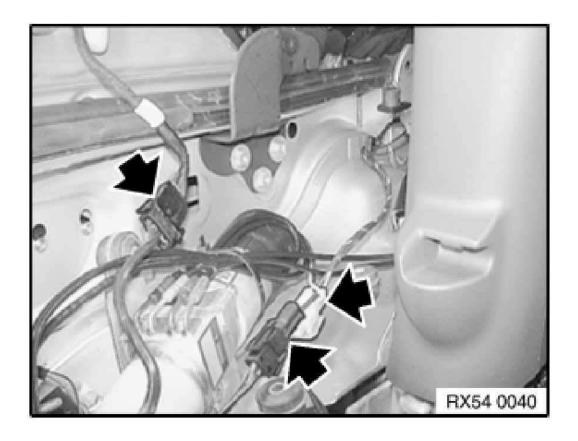


Fig. 53: Disconnecting Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug connection (1) from convertible top module.

Disconnect cable ties and feed wiring harness (2) out of body.

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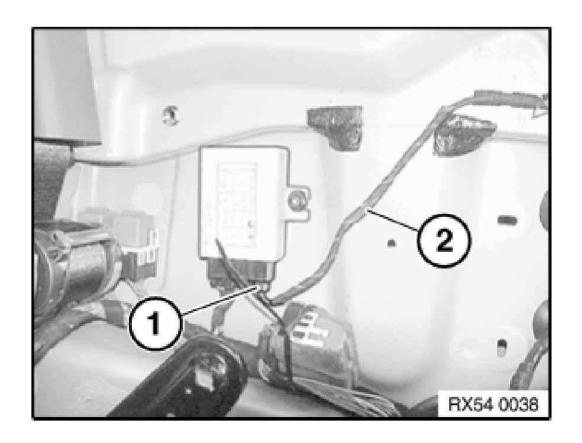


Fig. 54: Disconnecting Cable Ties And Feed Wiring Harness Courtesy of BMW OF NORTH AMERICA, INC.

BUILD DATE FROM 09/2005 WITH STOWAGE LOCK

Unclip wiring harness (1) from body.

Unlock and detach plug connection (2).

Unclip plastic connector (3) from Bowden cable and rotary actuator.

Feed out Bowden cable.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

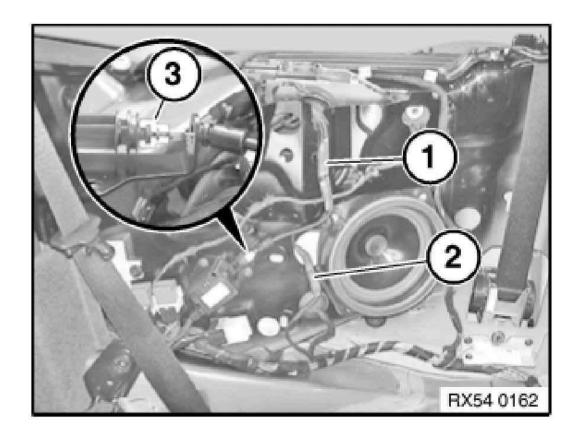


Fig. 55: Uncliping Plastic Connector From Bowden Cable And Rotary Actuator Courtesy of BMW OF NORTH AMERICA, INC.

Detach locking clip (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

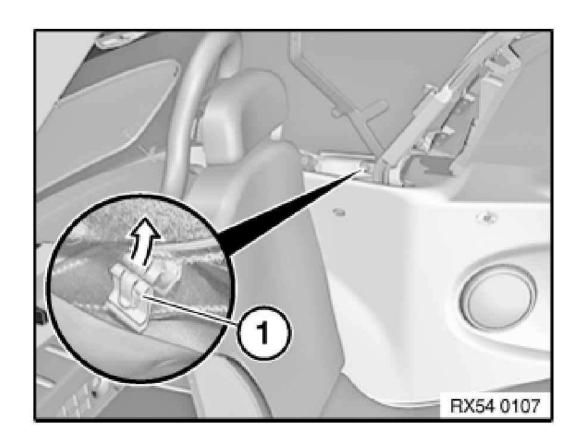


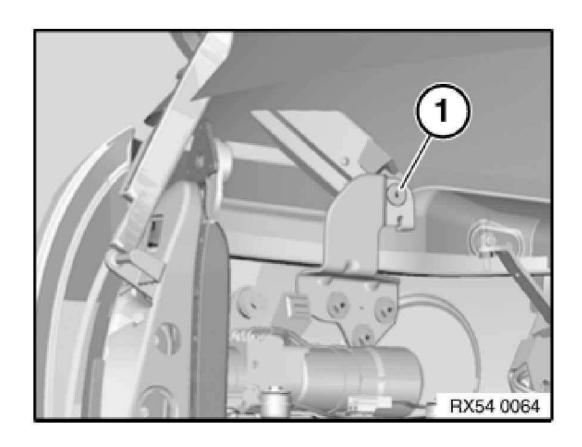
Fig. 56: Detaching Locking Clip Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

INSTALLATION

Insert screw (1) with Loctite.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 57: Releasing Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to piston rod of hydraulic cylinder when tool (1) is attached.

NOTE: Screw is not accessible when convertible top is stowed.

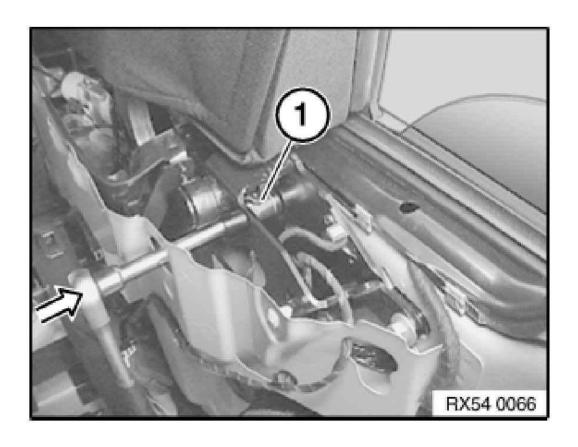
Raise convertible top by guide rails slightly.

Carefully insert tool (1) into body opening.

Release screw.

Tightening torque 54 34 1AZ. See CONVERTIBLE TOP - TORQUE SPECIFICATIONS.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 58: Inserting Tool Into Body Opening</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **54 34 1AZ.** See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

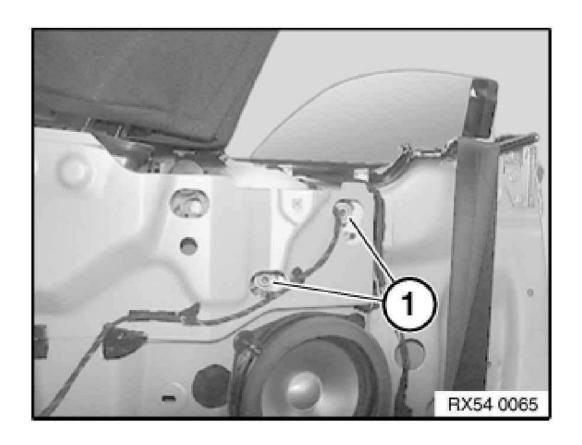


Fig. 59: Unscrewing Nuts Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

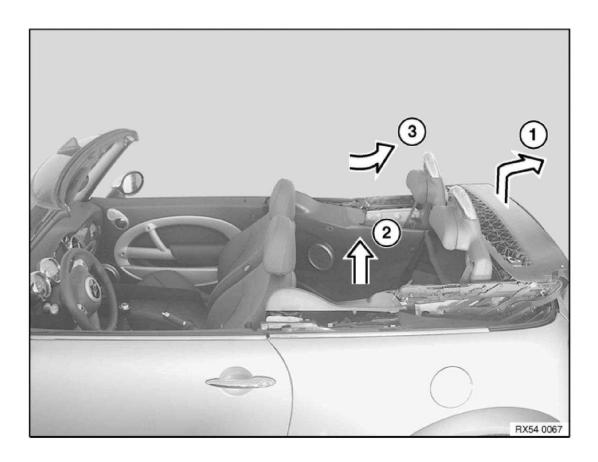


Fig. 60: Raising Convertible Top Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out this part of the work with the assistance of two other persons.

- 1. Raise convertible top slightly and pull main bearing off threaded pin towards rear.
- 2. Raise convertible top by main bearing evenly.
- 3. Carefully swivel convertible top at main bearing out of body. At the same time, raise and remove tension bar and hydraulic unit.

INSTALLATION

Carry out function check. See **Checking Function Of EH Convertible Top**.

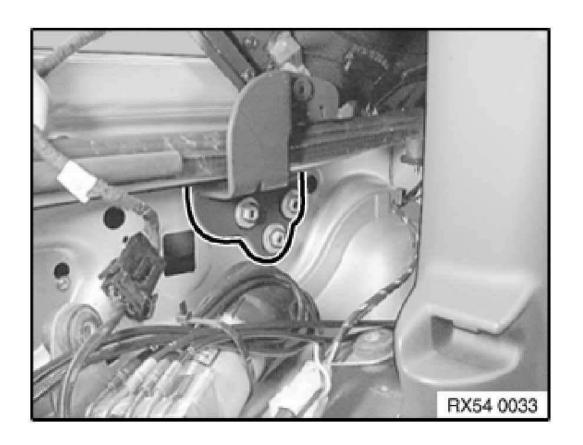
Check gap dimensions.

REMOVING TENSION BAR BEARING

Before removing tension bar bearing, mark position of bearing in relation to body.

When installing, align bearing to markings.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 61: Removing Tension Bar Bearing</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

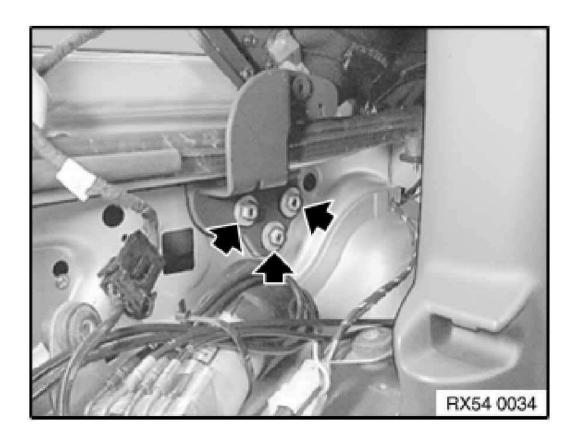
Tightening torque 54 34 4AZ. See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

Installation

Check gap dimensions.

If necessary, adjust spacing for convertible top longitudinal and vertical alignment.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 62: Unscrewing Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

RETAINING PLATE, CONVERTIBLE TOP

Before removing convertible top with retaining plate, mark position of main bearing in relation to body.

When installing convertible top, align main bearing with retaining plate to markings.

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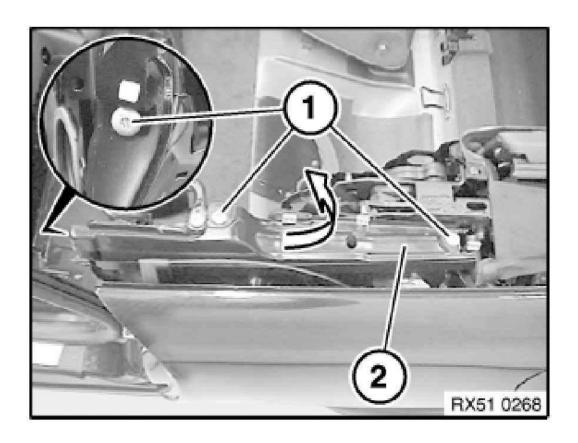
<u>Fig. 63: Retaining Plate, Convertible Top</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove window cavity cover strip.

Release screws (1) and remove connecting bracket (2).

Tightening torque 51 37 4AZ. See CONVERTIBLE TOP - TORQUE SPECIFICATIONS.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 64: Removing Screws And Connecting Bracket</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Feed out convertible top retaining plate upwards between power window unit and side member.

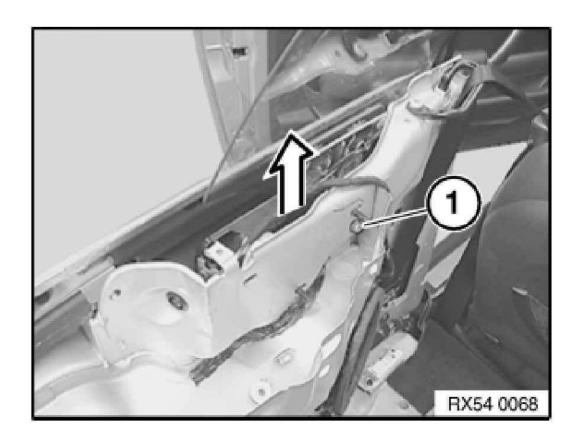
Installation

Check gap dimensions.

If necessary, adjust distance for convertible top longitudinal alignment.

Tighten screw (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 65: Releasing Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

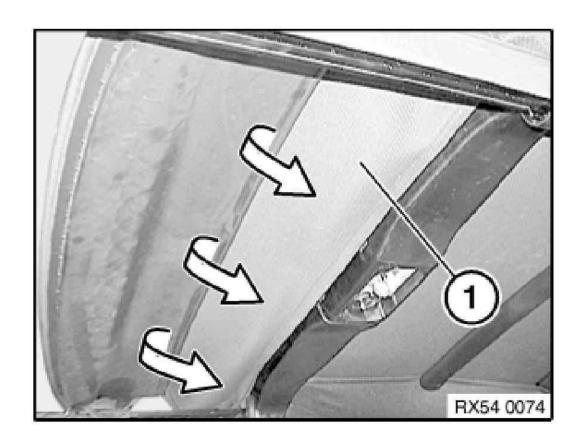
54 34 120 REPLACING CONVERTIBLE TOP FABRIC

NECESSARY PRELIMINARY TASKS

- Open folding roof approx. halfway
- Remove seals
- Remove convertible top **trim strips**
- Remove auxiliary brake light

Detach convertible top fabric (1) from front bow (rear).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 66: Detaching Convertible Top Fabric From Front Bow (Rear)</u> Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, lever convertible top fabric (1) with plastic wedge out of front bow (front).

Detach convertible top fabric (1) from front bow.

INSTALLATION

Attach double-sided adhesive tape to front bow and stick on convertible top from inside outwards.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

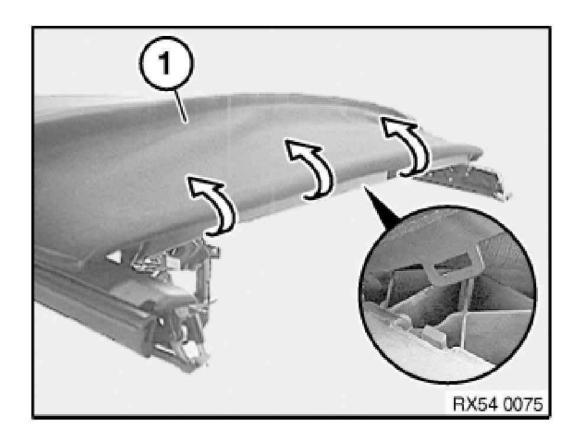


Fig. 67: Detaching Convertible Top Fabric From Front Bow Courtesy of BMW OF NORTH AMERICA, INC.

Detach tension cable (1) at side from roof frame.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

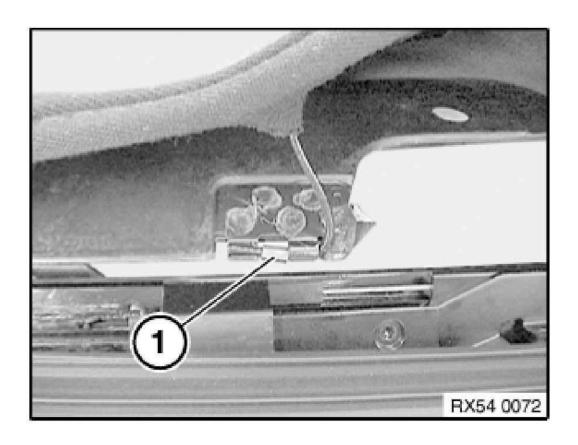


Fig. 68: Detaching Tension Cable Courtesy of BMW OF NORTH AMERICA, INC.

Disengage roof bow (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

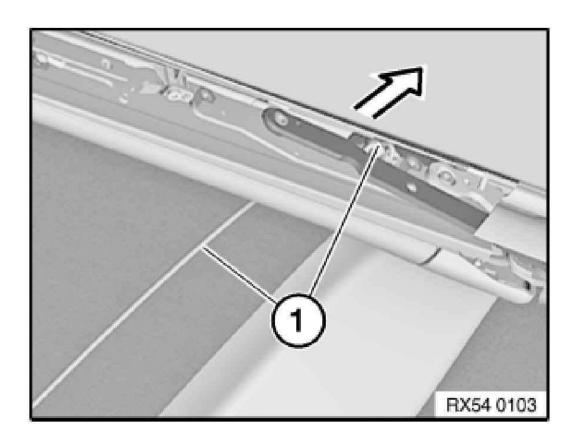
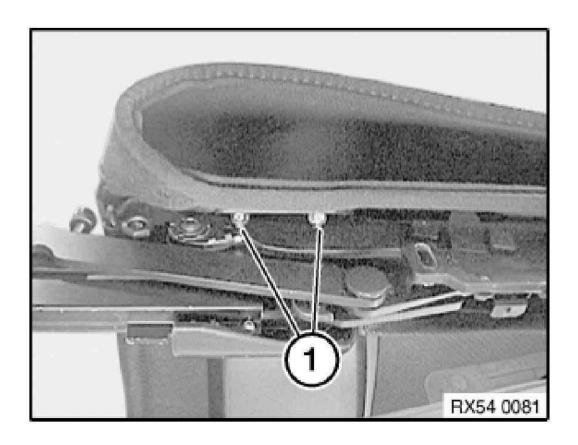


Fig. 69: Disengaging Roof Bow Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

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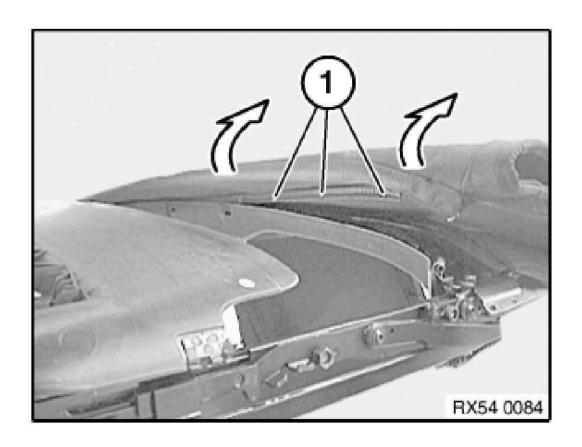
<u>Fig. 70: Unscrewing Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pull convertible top fabric (1) out of roof crossbar.

NOTE: Do not pull out convertible top fabric by the pockets.

Convertible top fabric is secured on each side with 3 retainers to roof crossbar.

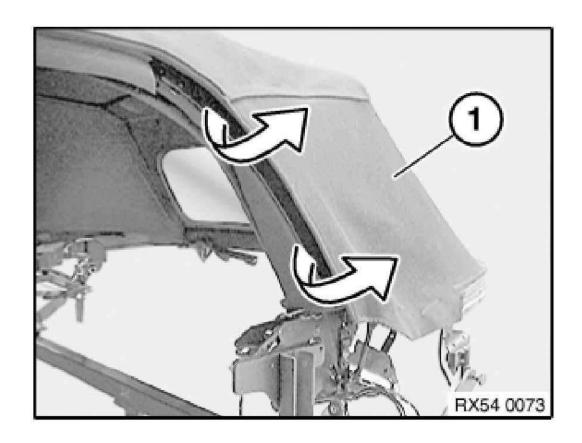
ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 71: Pulling Convertible Top Fabric</u> Courtesy of BMW OF NORTH AMERICA, INC.

Detach convertible top fabric (1) from convertible top frame.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 72: Detaching Convertible Top Fabric</u> Courtesy of BMW OF NORTH AMERICA, INC.

Feed out tension cable (1) and lever spring (2) out of pin.

INSTALLATION

Press spring circlip correctly onto pin groove.

Check for secure seating.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

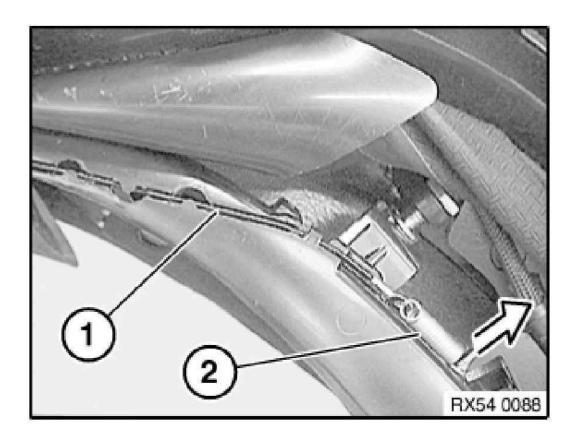
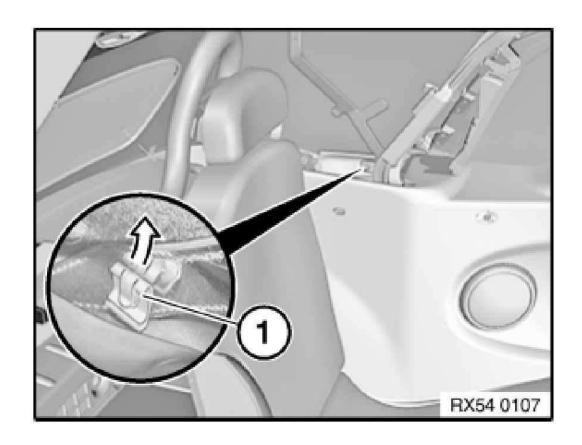


Fig. 73: Feeding Out Tension Cable And Lever Spring Courtesy of BMW OF NORTH AMERICA, INC.

Press roofliner to one side.

Detach locking clip (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 74: Detaching Locking Clip</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) for heated rear window.

Feed wiring harness (3) out of tension strap loop (2) and tension bar.

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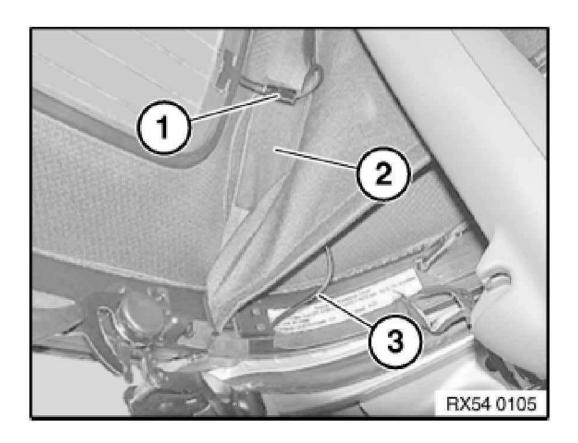


Fig. 75: Disconnecting Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove trim (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

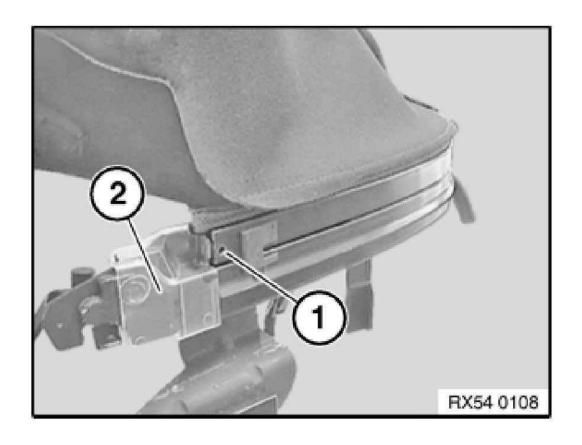
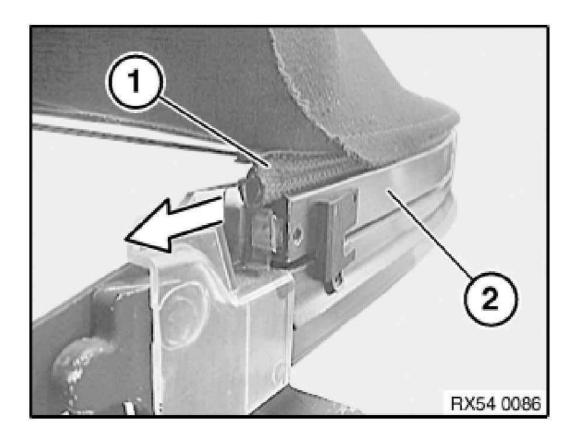


Fig. 76: Removing Screw And Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Pull convertible top fabric (1) out of tension bar guide (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 77: Pulling Convertible Top Fabric Out Of Tension Bar Guide</u> Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

<u>Check function of EH convertible top</u> and look out for folds in and tensioning of convertible top fabric. See <u>Checking Function Of EH Convertible Top</u>.

Check retaining hooks.

With new convertible top fabric, the force of the mechanism may not be sufficient to fully close the retaining hooks.

Open tension bar and close folding roof.

Relock tension bar.

Convertible top fabric is stretched and after settling the retaining hooks are correctly locked again.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

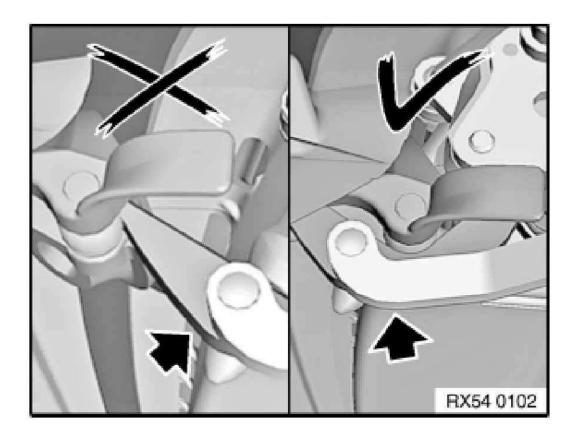


Fig. 78: Opening Tension Bar And Closing Folding Roof Courtesy of BMW OF NORTH AMERICA, INC.

54 34 120 REPLACING ELECTRO-HYDRAULIC CONVERTIBLE TOP FRAME

OVERVIEW OF ELECTRO-HYDRAULIC CONVERTIBLE TOP FRAME TO BE REMOVED

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

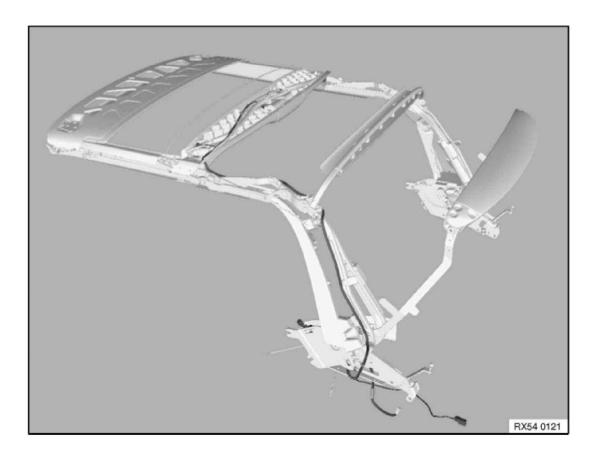


Fig. 79: Overview Of Electro-Hydraulic Convertible Top Frame Courtesy of BMW OF NORTH AMERICA, INC.

Replacing the electro-hydraulic convertible top frame comprises the following tasks:

- 1. Partially remove convertible top fabric
- 2. Remove **roofliner** in convertible top on left and right
- 3. Remove both tensioning belts
- 4. Remove EH convertible top without tension bar
- 5. Remove hydraulic cylinder for convertible top
- 6. If necessary, remove roof crossbar
- o Do not remove convertible top fabric from tension bar
- o Do not release tensioning bar from bearings

NOTE:

- Refer to OVERVIEW OF MECHANICAL CONVERTIBLE TOP COMPONENTS
- Read and comply with Notes on convertible top
- New convertible top frame is supplied with wiring harness

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

INSTALLATION

- Adjust convertible top
- Carry out function check See Checking Function Of EH Convertible Top.

REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ROOFLINER IN CONVERTIBLE TOP

NECESSARY PRELIMINARY TASKS

• Partially remove convertible top fabric

NOTE: Removal of the left roofliner is depicted.

Proceed in the same way for the right roofliner.

TENSION CABLES

Release Torx screws of reversing lugs for tension cables.

INSTALLATION

Replace Torx screws and insert with Loctite.

Observe course of front straps.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

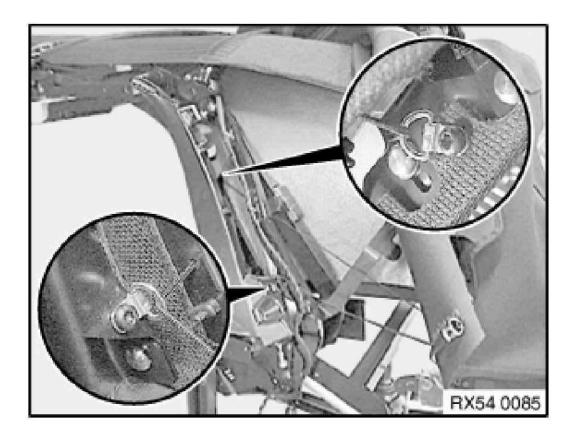
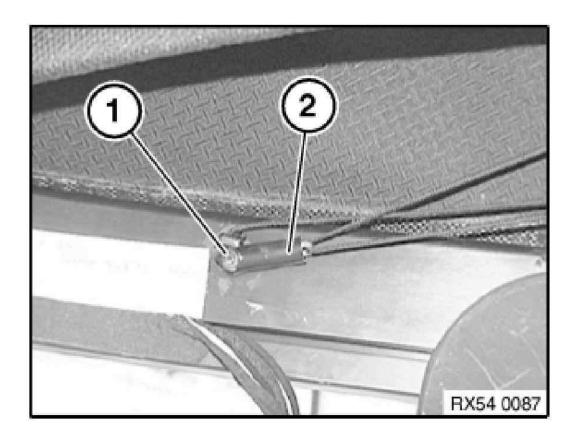


Fig. 80: Releasing Torx Screws Of Reversing Lugs Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivet from tension cable mounting on tension bar.

Completely remove rivets from tension bar (rattling noises).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 81: Removing Rivets From Tension Bar</u> Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivets (1) on tension bar.

Completely remove rivets from tension bar (rattling noises).

INSTALLATION

Rivet tension strap (2) with roofliner (3) to tension bar (tension strap on roofliner).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

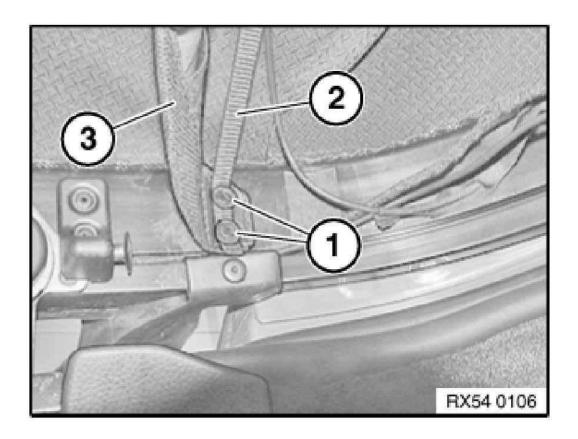
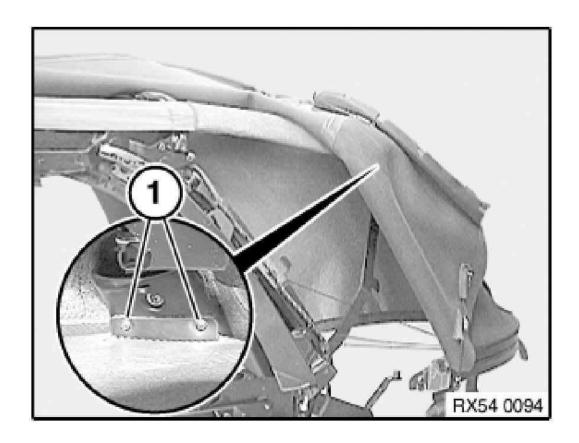


Fig. 82: Drilling Out Rivets On Tension Bar Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on bow.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

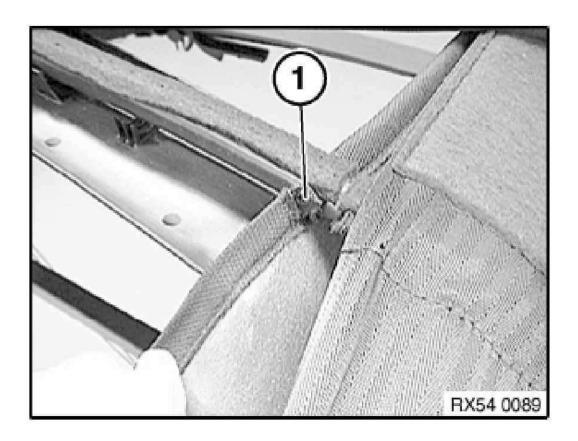


<u>Fig. 83: Releasing Screws On Bow</u> Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivets (1) on bow.

Completely remove rivets from bow (rattling noises).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

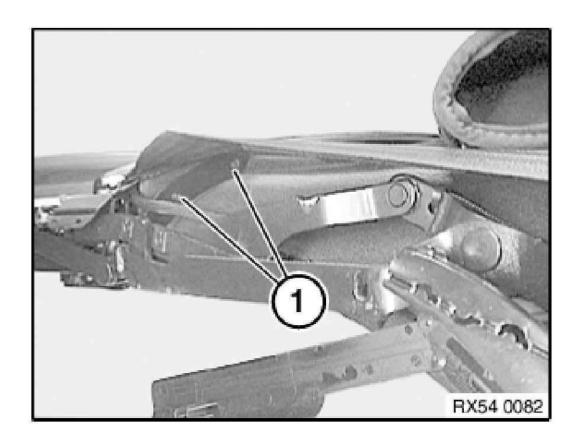


<u>Fig. 84: Drilling Out Rivets On Bow</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on roof crossbar.

Remove roofliner from convertible top frame.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 85: Releasing Screws On Roof Crossbar</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 140 REMOVING AND INSTALLING OR REPLACING BASE PLATE ON LEFT OR RIGHT

NECESSARY PRELIMINARY TASKS

• Remove panel for roof pillar at front

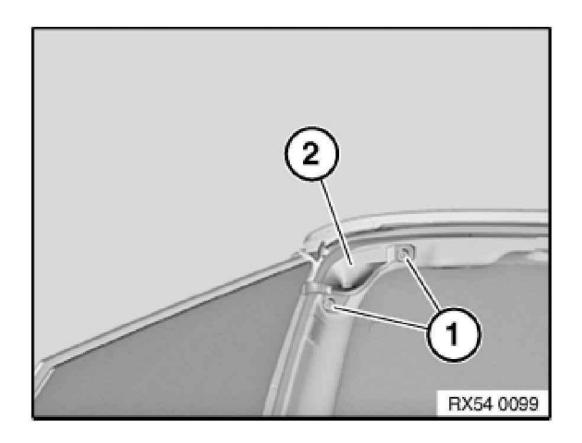
Release screws (1).

Tightening torque 54 34 3AZ. See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

INSTALLATION

Adjust base plate (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 86: Releasing Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 175 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT CONVERTIBLE TOP LOCKING HOOK

NECESSARY PRELIMINARY TASKS

- Remove guide rail panel
- Remove inner trim for guide rail
- Remove front seal

Release screw (1).

NOTE: Insert screw with Loctite.

Feed out locking hook.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

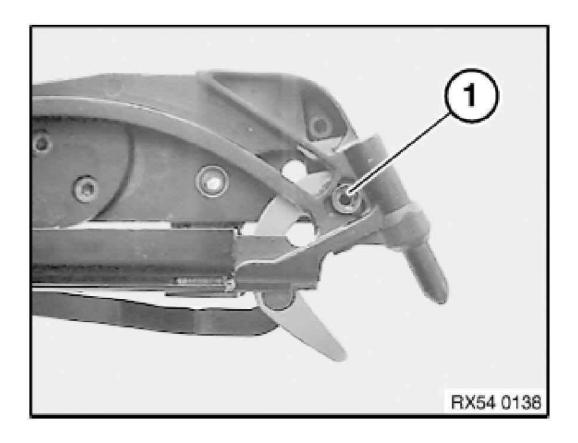


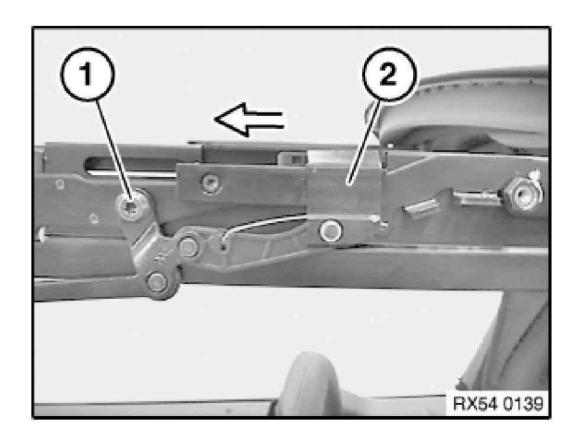
Fig. 87: Releasing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

NOTE: Insert screw with Loctite.

Slide carriage (2) forwards until both guide rail screws are accessible.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 88: Releasing Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

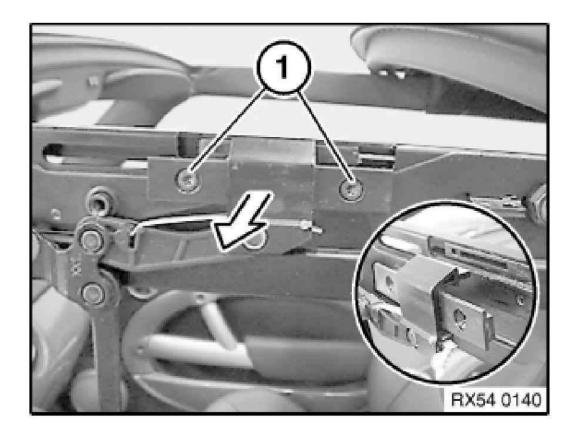
NOTE: Insert screws with Loctite.

Remove locking hook with guide rail.

INSTALLATION

Insert spring correctly in groove.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 89: Releasing Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out function check. See <u>Checking Function Of EH Convertible Top</u>.

54 34 181 REPLACING FOLDING SUNROOF MECHANISM (SLIDER PLATE WITH DRIVE CABLE)

IMPORTANT: If the drive shafts are torn, it is no longer possible to effect emergency release of the locking hooks via the folding sunroof drive unit.

Always replace both mechanisms with drive shafts.

Always conduct convertible top movements with the assistance of a second person (risk of damage).

Make sure force is always exerted uniformly to the convertible top sides otherwise the frame will be bent.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

NECESSARY PRELIMINARY TASKS

- Open complete side windows
- Remove drive unit for folding sunroof
- Open **convertible top lock** if drive shafts are faulty
- Remove inner trim for guide rail

Folding sunroof can now be opened manually.

Slide front bow towards rear:

- Remove front bow
- Remove front seal

Release screw (1).

Release screws (3).

NOTE: Feed out locking hook towards bottom.

Release screw (2).

Remove detent element (4).

INSTALLATION

Insert screws and tighten down as follows:

- 1. Screw (1)
- 2. Screw (2)
- 3. Screws (3)

Pull mechanism (1) with/without drive shafts out of guide rail.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

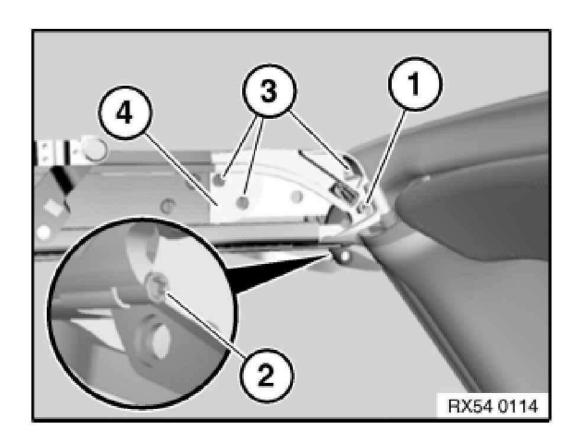
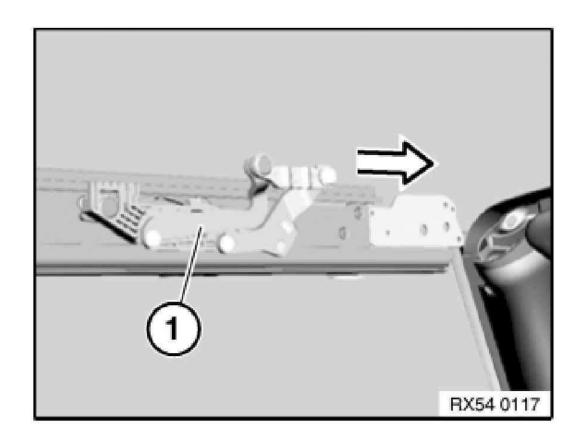


Fig. 90: Releasing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 91: Pulling Mechanism</u> Courtesy of BMW OF NORTH AMERICA, INC.

REMOVING TORN DRIVE SHAFTS FROM ROOF CROSSBAR

Install drive unit.

Insert offset hexagon socket and strike attachment with ball of hand until clutch can be felt to snap into place.

Remove drive shaft(s) from roof crossbar by turning hexagon socket.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

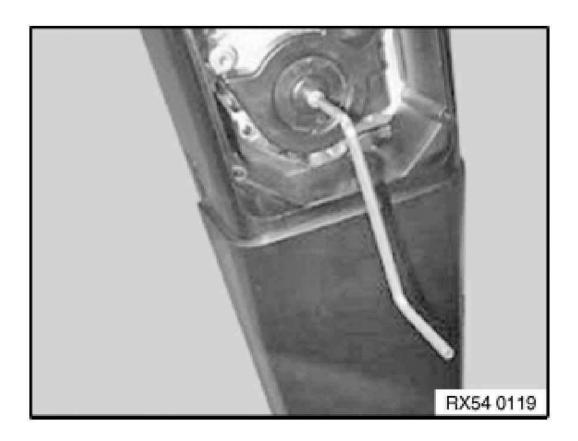
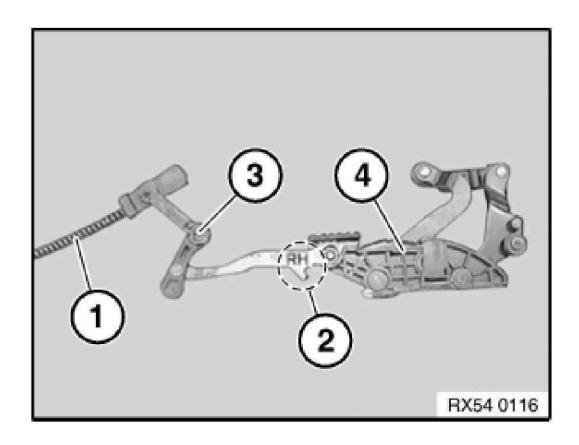


Fig. 92: Removing Torn Drive Shafts From Roof Crossbar Courtesy of BMW OF NORTH AMERICA, INC.

OVERVIEW OF MECHANISM FOR FOLDING SUNROOF

- 1. Input shaft
- 2. Coding
- 3. Articulated lever
- 4. Slider plate

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 93: Overview Of Mechanism For Folding Sunroof</u> Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

Turn slider plate upwards through 360°.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

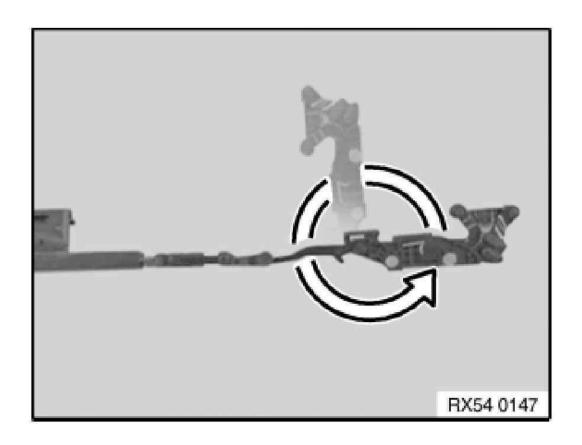
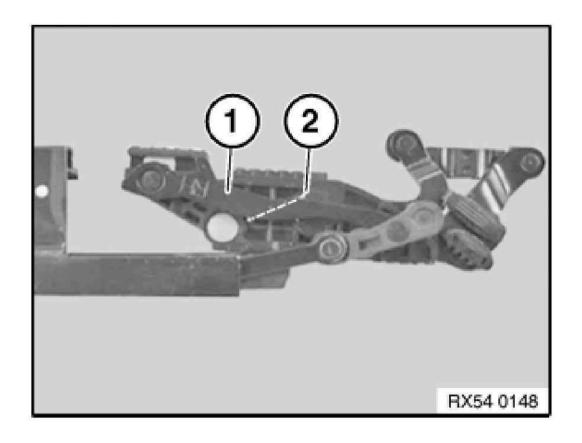


Fig. 94: Turning Slider Plate Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

Spring (2) must be engaged under control arm (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

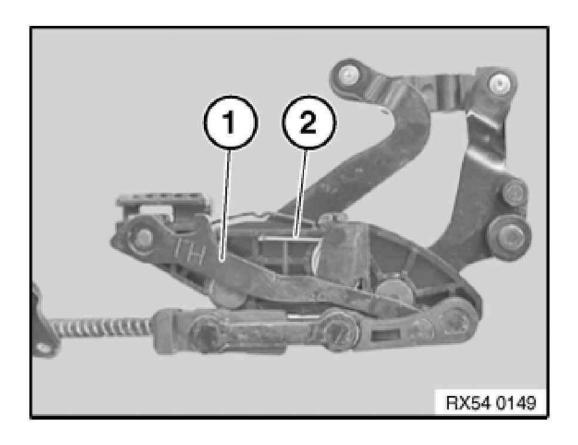


<u>Fig. 95: Installing Spring Under Control Arm</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Spring (2) is ineffective if it is not engaged under control arm (1).

Risk of damage to and clicking noises issuing from mechanism!

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 96: Control Arm</u> Courtesy of BMW OF NORTH AMERICA, INC.

Feed drive shaft (1) into guide rail and slide in.

Push slide element (2) onto guide rail.

Bend articulated lever (3) flat. Articulated lever and drive shaft form a line (dashed/dotted line).

Push in slider plate (4) completely up to end stop and thus align parallel to opposite side.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

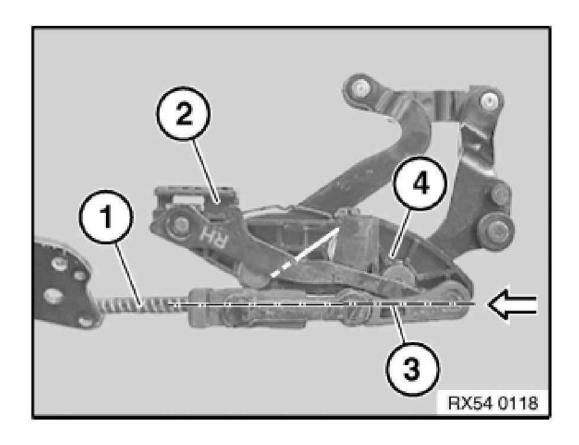
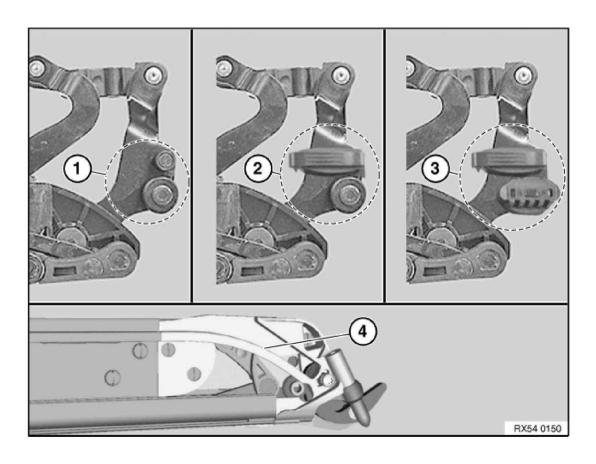


Fig. 97: Pushing Slide Element Onto Guide Rail Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 98: Replacing Roller And Slider</u> Courtesy of BMW OF NORTH AMERICA, INC.

REPLACEMENT ONLY

If slider plates with rollers (1) or roller and slider (2) are replaced by slider plates with sliders (3), then detent elements (4) must also be replaced.

Risk of damage to slider plates!

NOTE: Add final details to vehicle.

Carry out function check. See <u>Checking Function Of EH Convertible Top</u>.

54 34 191 REPLACING ROTARY ACTUATOR FOR STOWAGE LOCK

Necessary preliminary tasks:

• Remove rear left or right side trim panel

Unlock and detach plug connection (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Release screws and remove rotary actuator (2) from body.

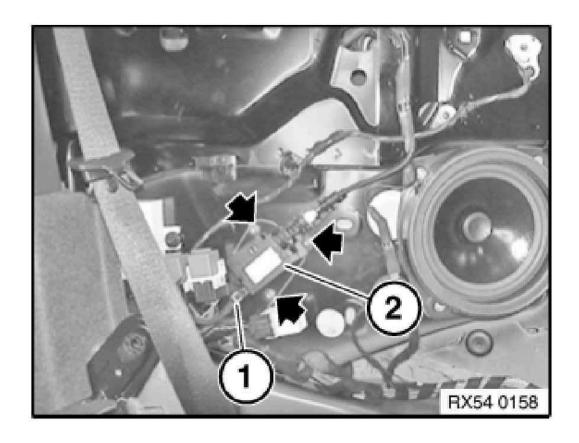
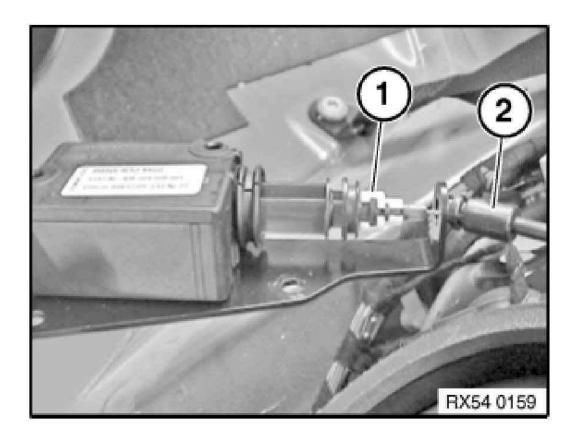


Fig. 99: Removing Screws And Rotary Actuator From Body Courtesy of BMW OF NORTH AMERICA, INC.

Unclip plastic connector (1).

Feed out Bowden cable (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 100: Uncliping Plastic Connector</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 192 REMOVING AND INSTALLING/REPLACING STOWAGE LOCK (09/2005)

NECESSARY PRELIMINARY TASKS

- Remove complete EH convertible top
- Secure convertible top on special tool (convertible top mounting)

INSTALLATION

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must **not** be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

Unclip wiring harness (1) from body.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Unlock and detach plug connection (2).

Unclip plastic connector (3) from rotary actuator and Bowden cable.

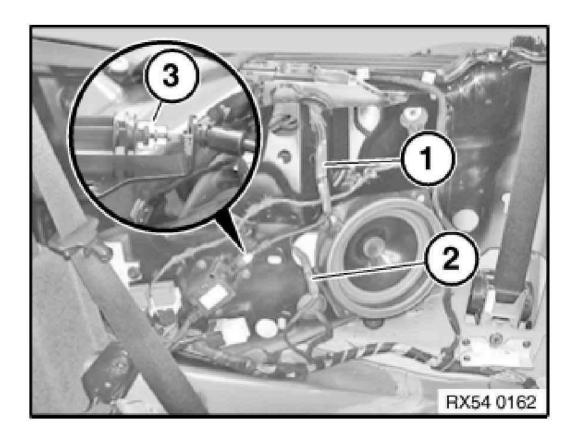


Fig. 101: Unlocking And Detach Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove camouflage (2) for main bearing.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

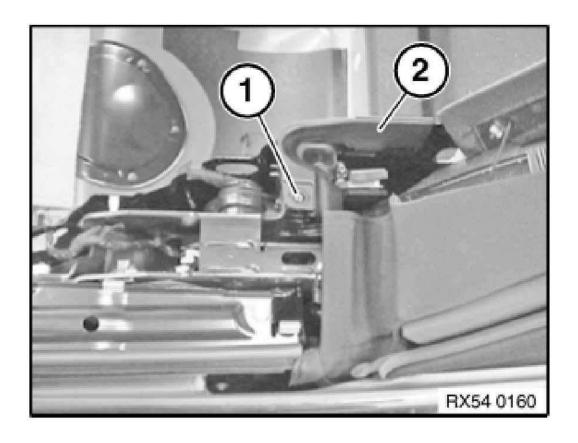
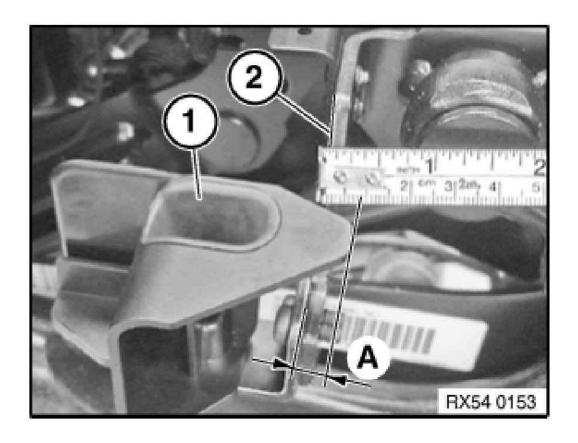


Fig. 102: Removing Camouflage For Main Bearing Courtesy of BMW OF NORTH AMERICA, INC.

Measure gap A between stowage lock (1) and main bearing (2). Note down gap A.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



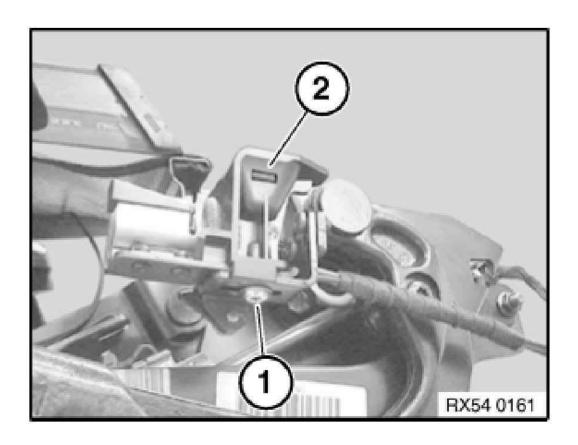
<u>Fig. 103: Measuring Gap A Between Stowage Lock And Main Bearing</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove stowage lock (2).

INSTALLATION

Adjust stowage lock (2) to gap A and screw down.



<u>Fig. 104: Removing Stowage Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 205 REMOVING AND INSTALLING/REPLACING ALL HYDRAULIC LINES ON CONVERTIBLE TOP

NECESSARY PRELIMINARY TASKS

• Follow **repair instructions** for hydraulic system

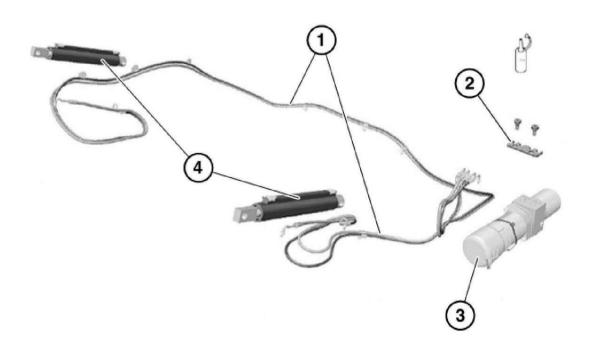
CAUTION: Hydraulic fluid may emerge from the disconnected lines and the open connections on the hydraulic cylinder.

Make sure that dirt cannot get into the hydraulic circuit.

Protect components and work area with suitable materials (e.g. cloths).

CONVERTIBLE TOP HYDRAULICS

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



RX54 0041

<u>Fig. 105: Overview Of Convertible Top Hydraulics</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect corresponding hydraulic lines (1) from:

- (3) hydraulic unit and
- (4) left or right hydraulic cylinder for convertible top

IMPORTANT: Transposed lines are not permitted. Do not kink or crush lines.

NOTE: Rod heads, hose outlet and connection fasteners can be turned as desired on the cylinder and hydraulic unit! Fully open and close convertible top approx. 10

times in order to bleed the system. Check oil level.

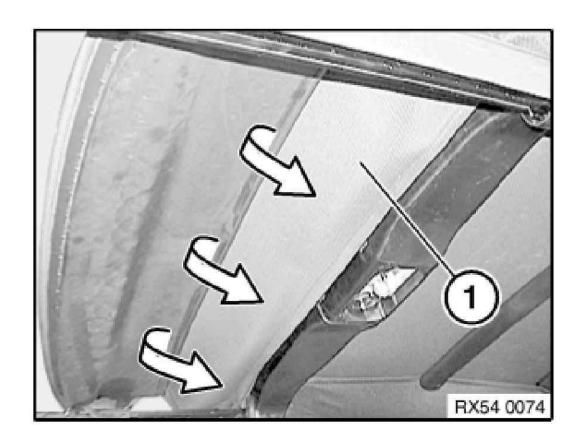
54 34 211 REPLACING LEFT OR RIGHT TENSION CABLE

NECESSARY PRELIMINARY TASKS

- Open folding roof approx. halfway
- Remove seals

Detach convertible top fabric (1) from front bow (rear).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 106: Detaching Convertible Top Fabric From Front Bow (Rear)</u> Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, lever convertible top fabric (1) with plastic wedge out of front bow (front).

Detach convertible top fabric (1) from front bow.

INSTALLATION

Attach double-sided adhesive tape to front bow and stick on convertible top from inside outwards.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

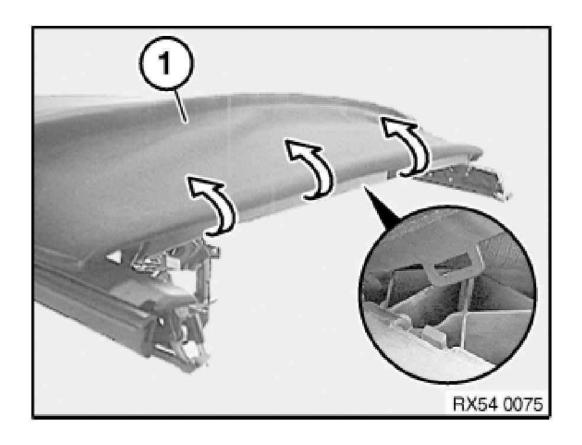


Fig. 107: Detaching Convertible Top Fabric From Front Bow Courtesy of BMW OF NORTH AMERICA, INC.

Detach tension cable (1) at side from roof frame.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

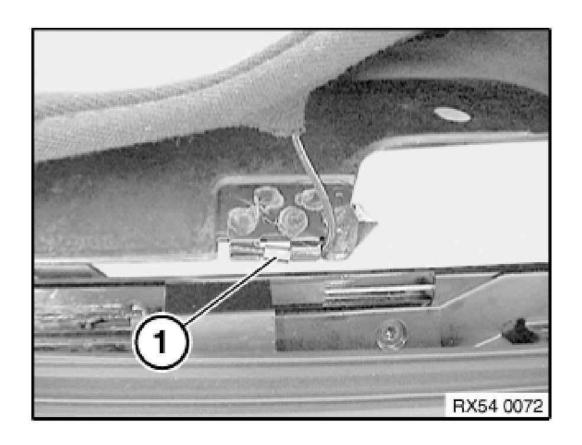


Fig. 108: Detaching Tension Cable Courtesy of BMW OF NORTH AMERICA, INC.

Disengage roof bow (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

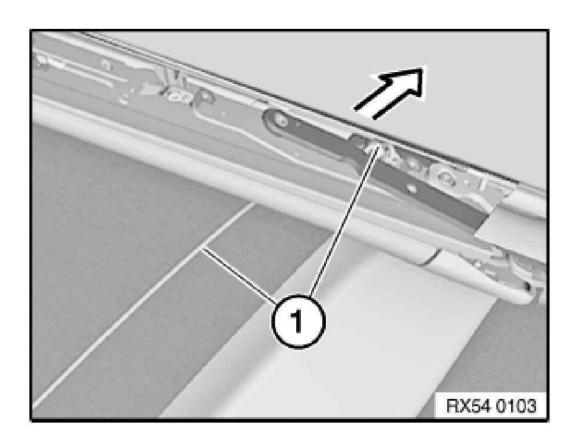


Fig. 109: Disengaging Roof Bow Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

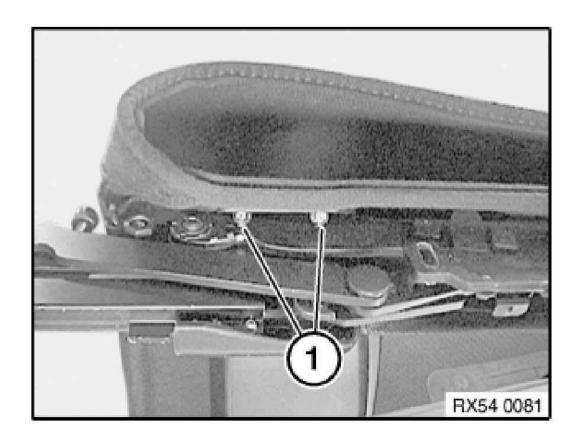


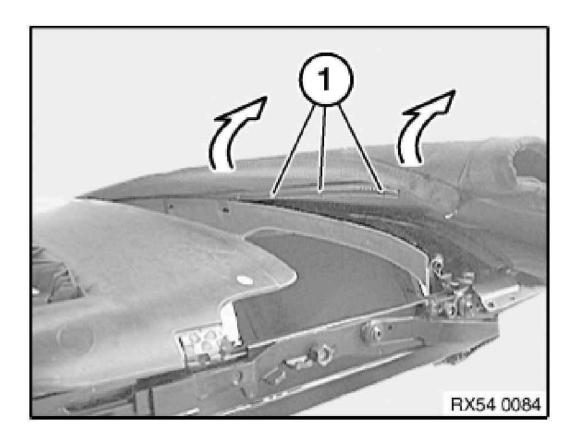
Fig. 110: Unscrewing Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Pull convertible top fabric (1) out of roof crossbar.

NOTE: Do not pull out convertible top fabric by the pockets.

Convertible top fabric is secured on each side with 3 retainers to roof crossbar.

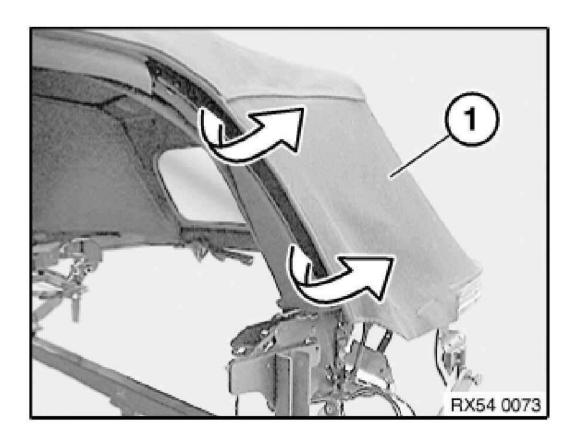
ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 111: Pulling Convertible Top Fabric Out Of Roof Crossbar</u> Courtesy of BMW OF NORTH AMERICA, INC.

Detach convertible top fabric (1) from convertible top frame.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 112: Detaching Convertible Top Fabric</u> Courtesy of BMW OF NORTH AMERICA, INC.

Feed out tension cable (1) and lever spring (2) out of pin.

INSTALLATION

Press spring circlip correctly onto pin groove.

Check for secure seating.

Remove tension cable from fabric pockets and feed in new tension cable.

Carry out function check. See Checking Function Of EH Convertible Top.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

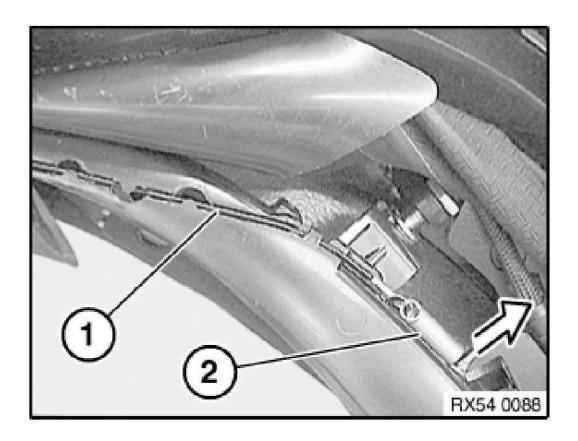


Fig. 113: Feeding Out Tension Cable And Lever Spring Courtesy of BMW OF NORTH AMERICA, INC.

54 34 250 REMOVING AND INSTALLING/REPLACING A TENSION STRAP

NECESSARY PRELIMINARY TASKS

• Partially remove convertible top fabric

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

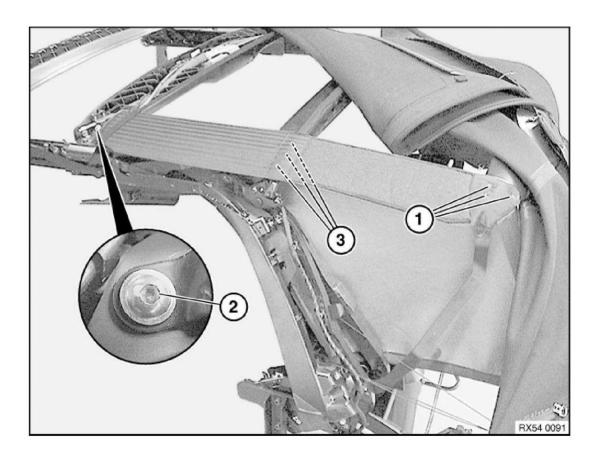


Fig. 114: Drilling Out Rivets On Main Bow And Removing Completely Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on corner bows.

Drill out rivets (3) on main bow and remove completely (rattling noises).

Release screw (2) on roof crossbar.

Build date from 10/2005:

Tension strap is shortened up to main bow.

Release screw (2) on main bow.

Rivets (3) omitted.

Drill out rivets (1) for tension strap fastening (2) and roofliner (3).

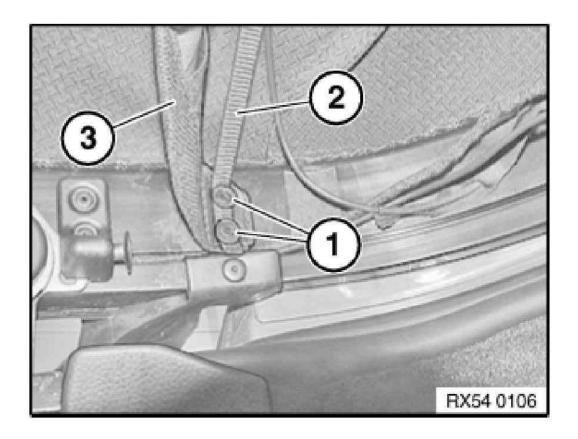
NOTE: Completely remove rest of rivets from tension bar (rattling noises).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Remove tension strap.

INSTALLATION

Rivet tension strap (2) with roofliner (3) to tension bar (tension strap on roofliner).



<u>Fig. 115: Drilling Out Rivets For Tension Strap Fastening</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 337 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT SEAL

NECESSARY PRELIMINARY TASKS

• Remove panel on guide rail

Unfasten screws.

INSTALLATION

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Replace screws and insert with Loctite.

Remove front seal (1).

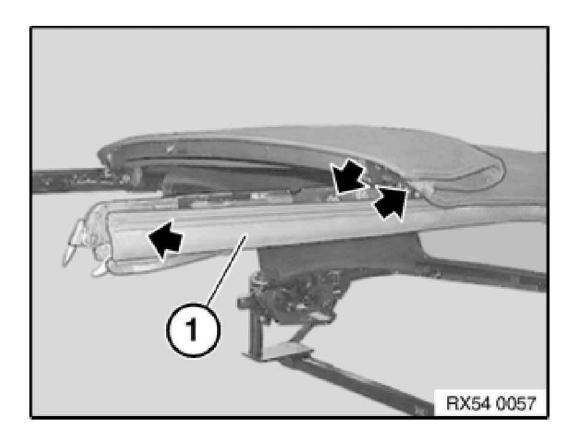


Fig. 116: Removing Front Seal Courtesy of BMW OF NORTH AMERICA, INC.

CARRY OUT FUNCTION CHECK

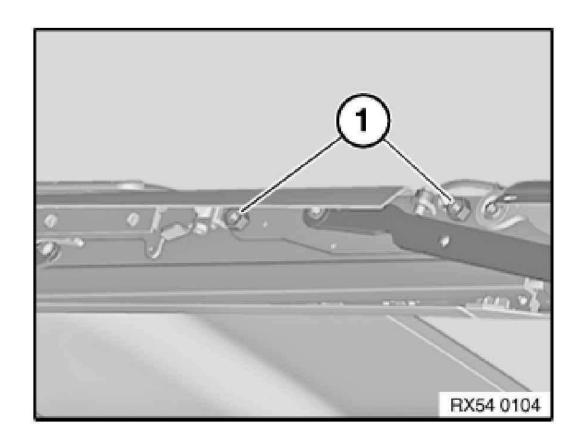
Align front seal to A-pillar seal and roof frame seal.

Side window must run into seal correctly and rest in seal over entire width.

Build date up to 10/2005:

If necessary, adjust seal by way of hexagon nuts (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 117: Hexagon Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

Seal (1) must rest cleanly in pocket of cowl panel seal (2).

Pocket (2) must not be crushed.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

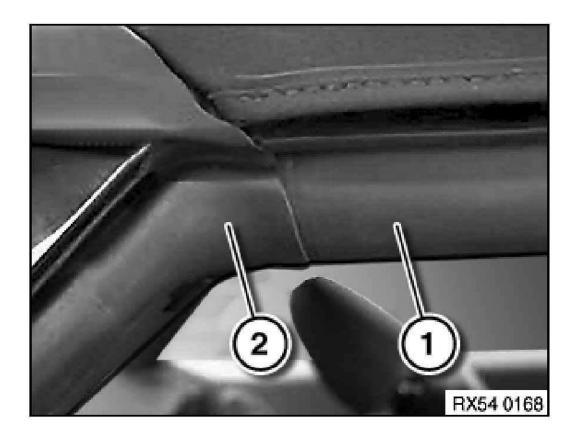


Fig. 118: Cowl Panel Seal Courtesy of BMW OF NORTH AMERICA, INC.

54 34 341 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ROOF FRAME SEAL

NECESSARY PRELIMINARY TASKS

• Partially remove roof frame panel

NOTE: When removing seal, look out for loose threaded bushes in convertible top frame.

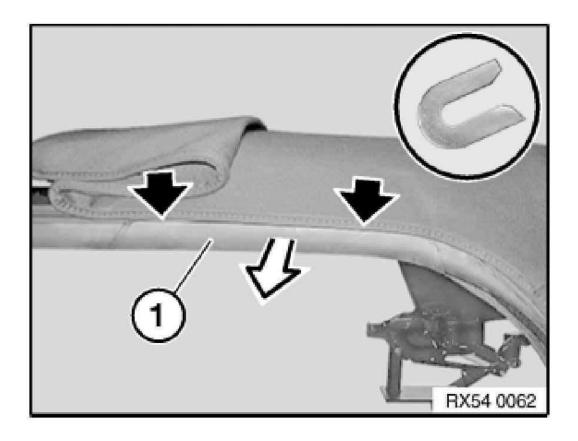
Unfasten screws.

Remove threaded bushes from convertible top frame.

INSTALLATION

Replace screws and insert with Loctite.

Takeoff seal.



<u>Fig. 119: Removing Threaded Bushes</u> Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

Roof frame seal must be flush with front and rear seals.

Align roof frame seal with shims.

Side windows must run into seal correctly and rest in seal over entire width.

Check function. See **Checking Function Of EH Convertible Top**.

If necessary, adjust side window.

54 34 343 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SEAL

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

NECESSARY PRELIMINARY TASKS

- Open convertible top approx. halfway
- Open side windows

Release screw.

INSTALLATION

Replace screw and insert with Loctite.

REMOVING SEAL

Pull seal in direction (1).

Slide seal downwards (2).

Remove seal from seal carrier.

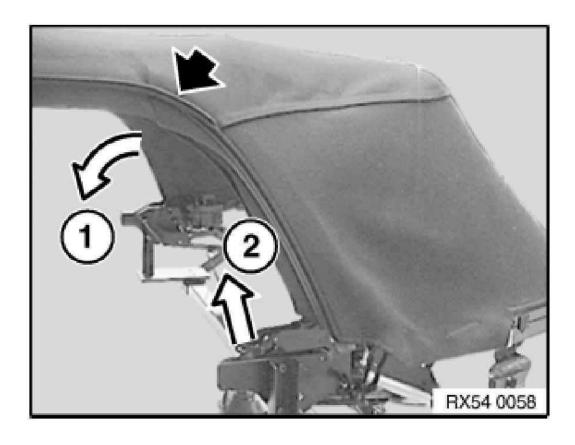


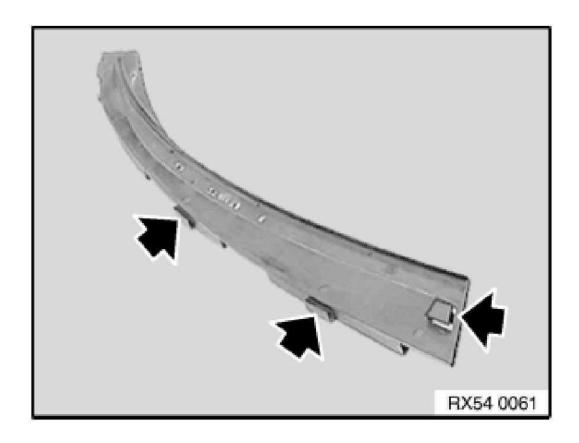
Fig. 120: Removing Seal

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

Make sure guides are correctly seated in seal carrier.



<u>Fig. 121: Installing Guides In Seal Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

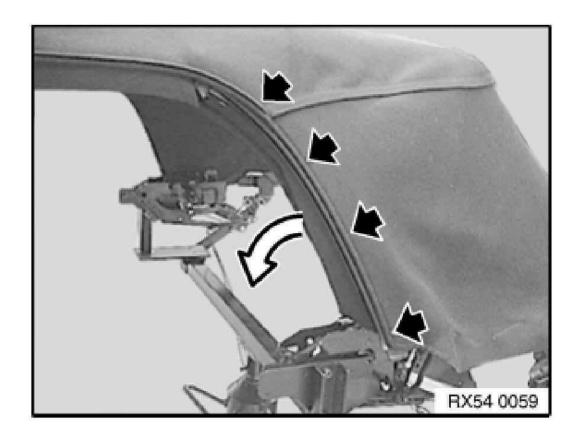
Unfasten screws.

INSTALLATION

Replace screws and insert with Loctite.

Remove seal carrier.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 122: Removing Seal Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check function. See **Checking Function Of EH Convertible Top**.

Side window must run into seal correctly and rest in seal over entire width.

If necessary, adjust side window.

54 34 350 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT CONVERTIBLE TOP TRIM STRIP

NECESSARY PRELIMINARY TASKS

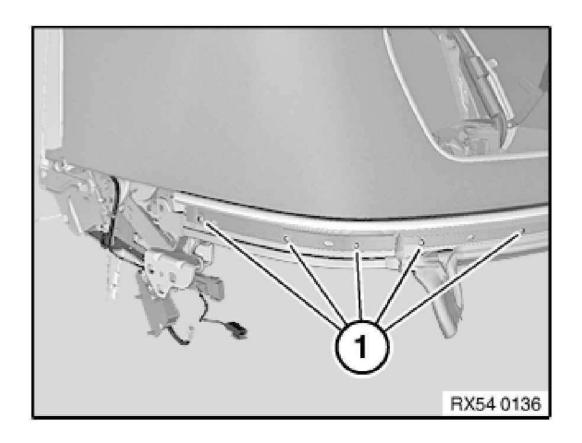
- Open loading aid
- Remove auxiliary brake light

NOTE: The right trim strip is removed in the same way as the left trim strip shown.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Release screws (1).

Remove trim strip.



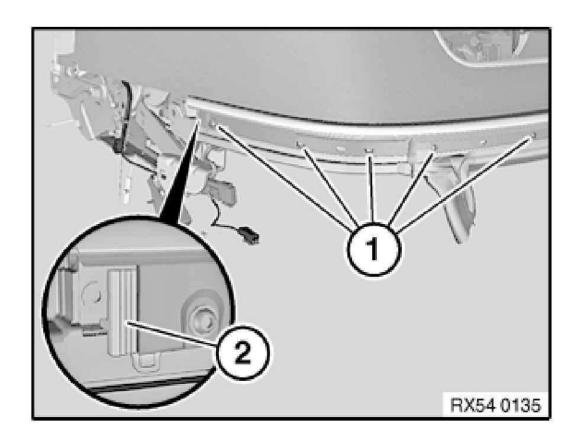
<u>Fig. 123: Releasing Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

If necessary, insert wedge (2) for trim strip in tension bar.

Secure trim strip on tension bar with screws (1) (do not tighten down).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 124: Inserting Wedge For Trim Strip In Tension Bar</u> Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting trim strip in relation to window cavity cover strip:

Align trim strip with wedge to window cavity cover strip.

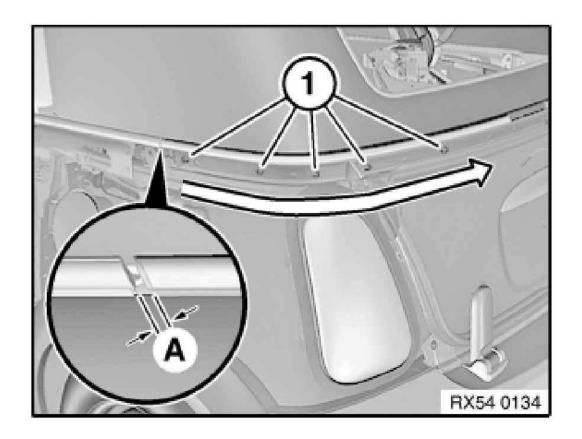
A = 4.5 mm

NOTE: Trim strips must be horizontally and vertically flush.

Tighten down screws in sequence.

Tightening torque 54 34 10AZ. See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 125: Securing Trim Strip On Tension Bar With Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

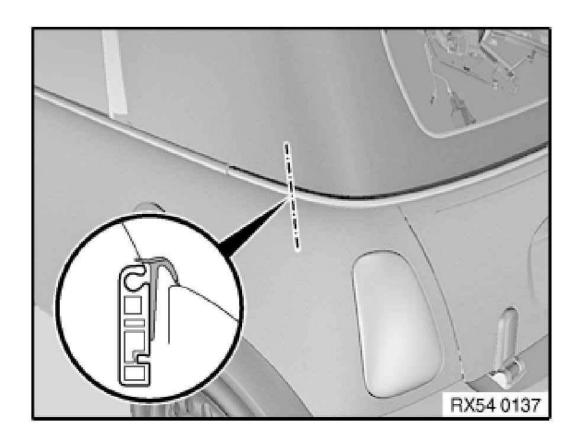
INSTALLATION

Carry out function test. See **Checking Function Of EH Convertible Top**.

Tension bar must immerse flawlessly into body.

Trim strip seal must rest correctly on body cutout.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



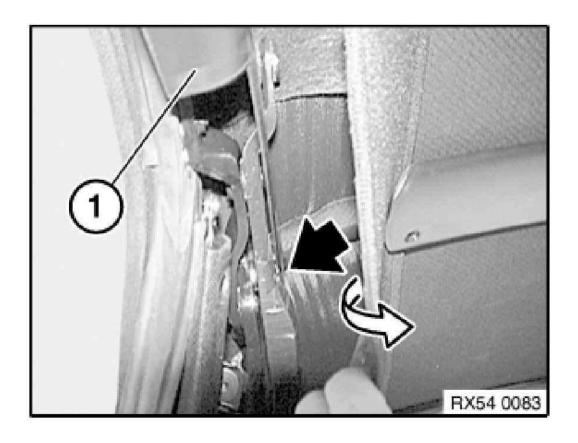
<u>Fig. 126: Trim Strip Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 355 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ROOF FRAME PANEL

Pull roofliner to one side.

Release screw and pull panel (1) off roof frame towards rear.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 127: Releasing Screw And Pulling Panel Off Roof Frame Towards Rear</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Retrofit panel without felt in marked area (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

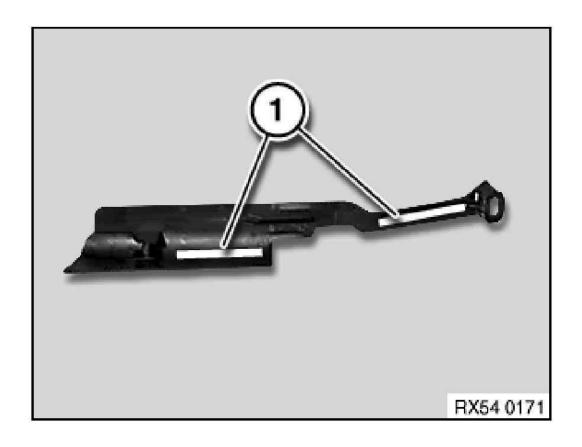


Fig. 128: Retrofitting Panel Without Felt Courtesy of BMW OF NORTH AMERICA, INC.

54 34 357 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT GUIDE RAIL PANEL

NECESSARY PRELIMINARY TASKS

• Open folding roof

Release screws (1).

Remove panel (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

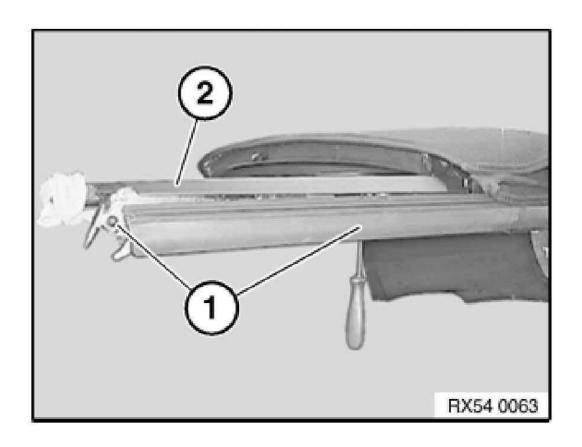


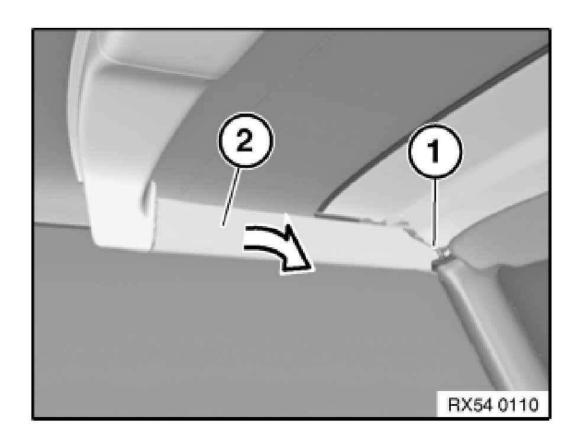
Fig. 129: Removing Panel Courtesy of BMW OF NORTH AMERICA, INC.

54 34 359 REMOVING AND INSTALLING/REPLACING INNER TRIM FOR LEFT OR RIGHT GUIDE RAIL

Release screw (1).

Remove guide rail trim (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 130: Removing Guide Rail Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Trim without felt in marked area (1) must be replaced with a new part (rattling noises).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

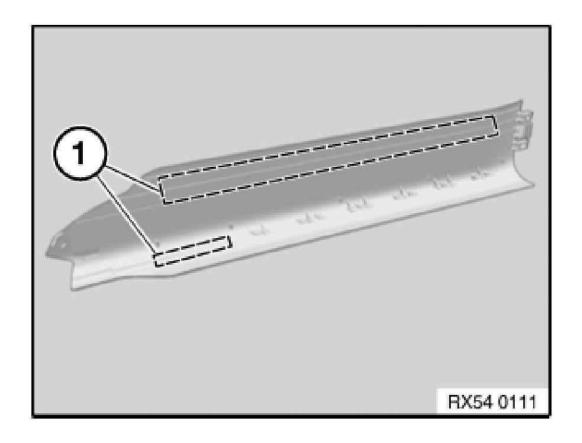


Fig. 131: Timing Without Felt In Marked Area Courtesy of BMW OF NORTH AMERICA, INC.

54 34 365 REMOVING AND INSTALLING FRONT BOW

NECESSARY PRELIMINARY TASKS

• Partially remove convertible top fabric

Mark screws (1).

Release left and right screws (1).

Remove front bow (2).

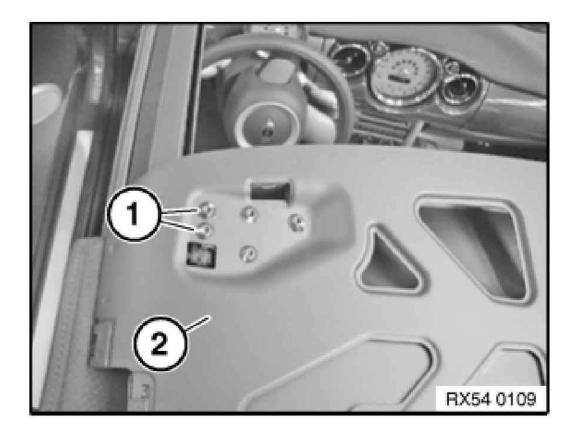
INSTALLATION

Align front bow centrally and align to cowl panel seal with convertible top closed.

Insert screws with Loctite.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Tightening torque 54 34 8AZ. See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.



<u>Fig. 132: Removing Front Bow</u> Courtesy of BMW OF NORTH AMERICA, INC.

ADJUSTING FRONT BOW

Mark all screws.

Slacken screws.

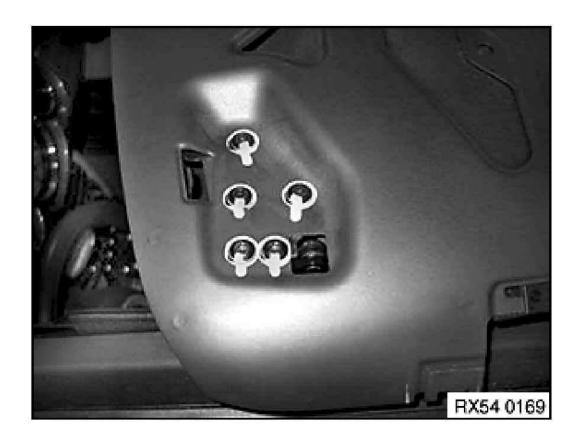
Tightening torque 54 34 RX54 0189 See CONVERTIBLE TOP - TORQUE SPECIFICATIONS.

Align front bow centrally and align to cowl panel seal with convertible top closed.

INSTALLATION

Check for leaks. If necessary, repeat work steps.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 133: Aligning Front Bow</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 370 REPLACING TENSION BAR

NECESSARY PRELIMINARY TASKS

• Remove auxiliary brake light

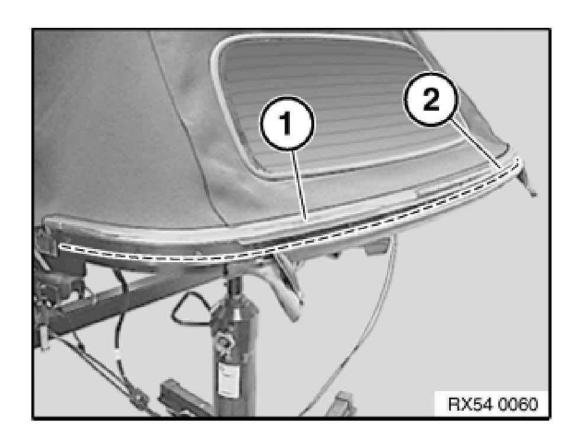
THE INDIVIDUAL OPERATIONS ARE DESCRIBED IN DETAIL IN

Removing trim strips on convertible top:

Release screws along marked area.

Remove trims strips on left (1) and right (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 134: Removing Trims Strips On Left And Right</u> Courtesy of BMW OF NORTH AMERICA, INC.

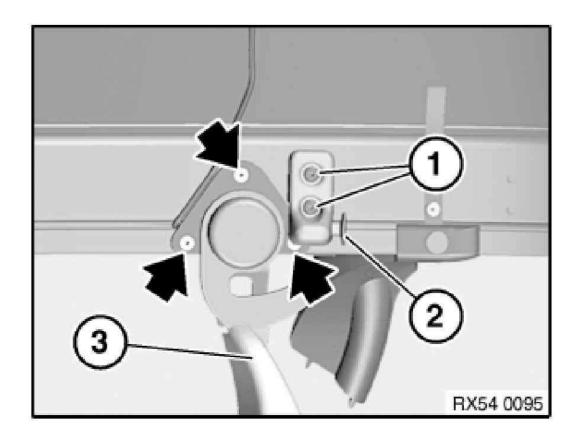
Removing locking tension bar with joint:

Drill out rivets (1) and remove bearing (2).

Drill out rivets from tension bar joint.

Remove locking tension bar (3) with joint and seal.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 135: Removing Locking Tension Bar With Joint And Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) for heated rear window.

Feed wiring harness (3) out of tension strap loop (2) and tension bar.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

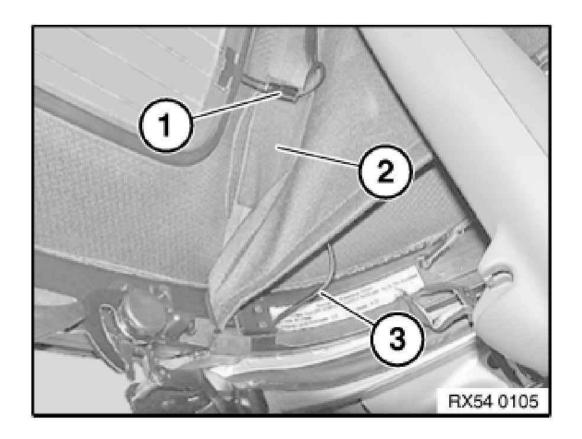


Fig. 136: Disconnecting Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Removing tension straps and roofliner from tension bar:

Drill out rivets (1) for tension strap (2) and roofliner (3).

INSTALLATION

Fit tension strap (2) on roofliner (3).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

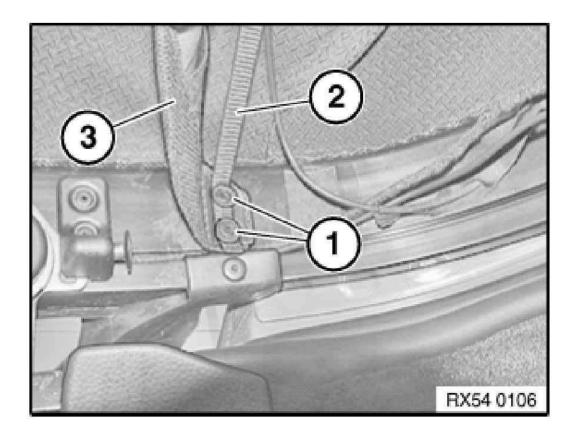
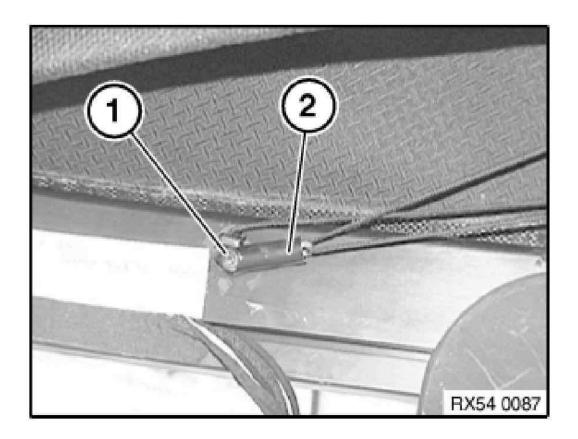


Fig. 137: Drilling Out Rivets For Tension Strap And Roofliner Courtesy of BMW OF NORTH AMERICA, INC.

Removing **tension cable fastening (2)**: Remove tension straps and roof liner from tension bar. Drill out rivets (1) for tension strap (2) and roofliner (3). Drill out rivets (1) for tension straps.

Drill off rivet (1).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 138: Drilling Out Rivets For Tension Strap And Roofliner</u> Courtesy of BMW OF NORTH AMERICA, INC.

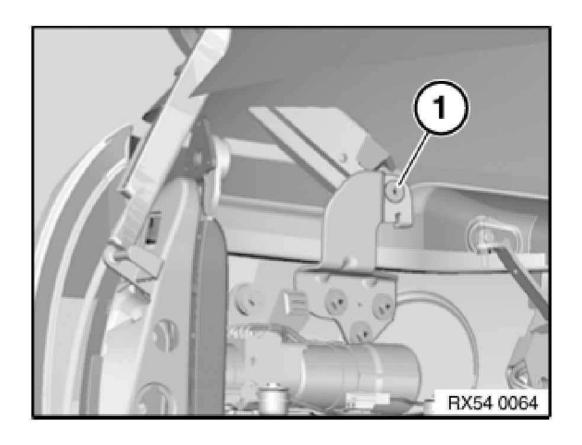
Removing tension bar:

Release screw (1).

INSTALLATION

Insert screw (1) with Loctite.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



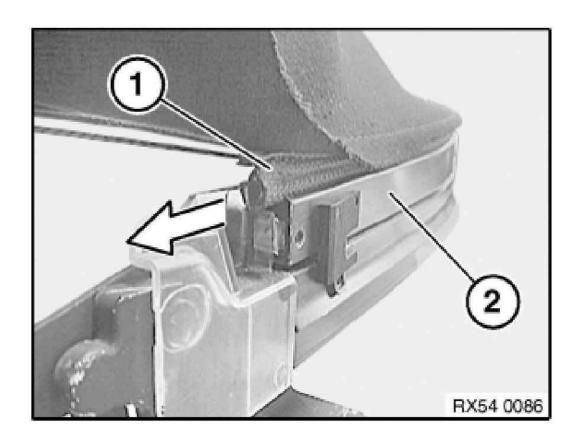
<u>Fig. 139: Releasing Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Removing convertible top fabric from tension bar:

Pull convertible top fabric (1) with wiring harness out of tension bar (2).

NOTE: Do not pull out convertible top fabric by the pockets.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 140: Pulling Convertible Top Fabric</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 375 REPLACING LEFT OR RIGHT LOCKING TENSION BAR

NECESSARY PRELIMINARY TASKS

• Unlock locking tension bar

LOCKING TENSION BAR ONLY

Lift out cover cap.

Drive out locking pin (1).

Remove locking tension bar.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

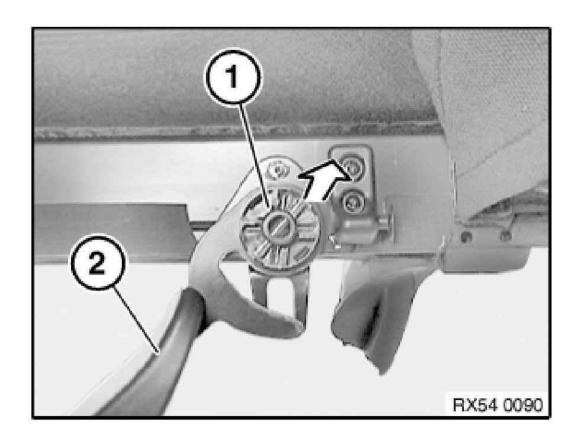


Fig. 141: Driving Out Locking Pin Courtesy of BMW OF NORTH AMERICA, INC.

LOCKING TENSION BAR WITH TENSION BAR JOINT

First drill out rivets (1).

NOTE: Completely remove rivet remnants (rattling noises).

If necessary, remove tension bar on left and right from bearing.

Remove bearing (2).

Drill out rivets from tension bar joint.

Remove locking tension bar (3) with joint.

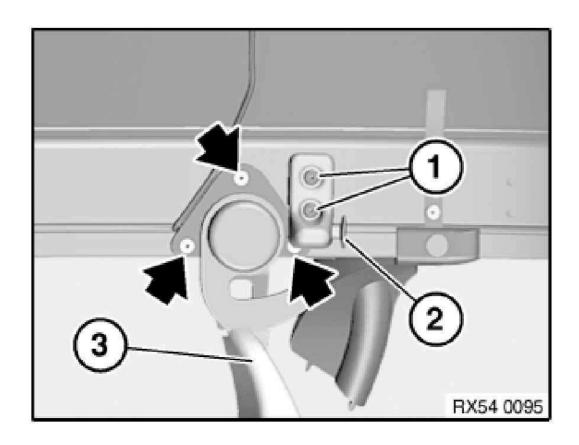


Fig. 142: Removing Locking Tension Bar With Joint Courtesy of BMW OF NORTH AMERICA, INC.

54 34 378 REMOVING AND INSTALLING/REPLACING CONVERTIBLE TOP TENSION BAR BEARINGS

NECESSARY PRELIMINARY TASKS

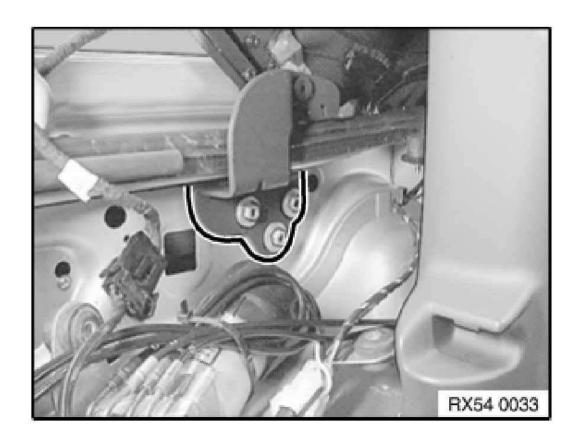
• Remove luggage compartment wheel arch trim

Before removing tension bar bearing, mark position of bearing in relation to body.

INSTALLATION

When installing, align bearing to markings.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



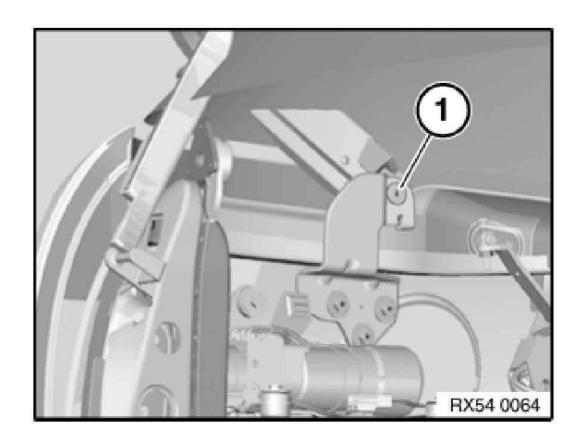
<u>Fig. 143: Marking Tension Bar Bearing</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

INSTALLATION

Insert screw (1) with Loctite.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 144: Releasing Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

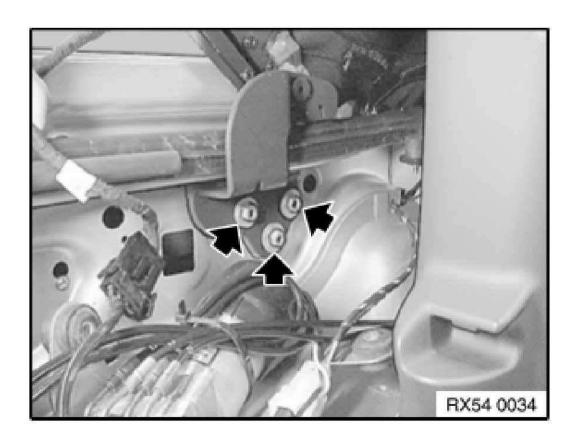
Tightening torque 54 34 4AZ. See **CONVERTIBLE TOP - TORQUE SPECIFICATIONS**.

INSTALLATION

Check gap dimensions.

If necessary, adjust spacing for convertible top longitudinal and vertical alignment.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 145: Unscrewing Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

54 34 380 REMOVING AND INSTALLING/REPLACING ROOF CROSSBAR

NECESSARY PRELIMINARY TASKS

- Remove guide rail panel
- Remove convertible top fabric partially
- Remove **roofliner** from roof crossbar
- Unlock retaining hook

REMOVING LEFT/RIGHT TENSION STRAPS IF NECESSARY (DEPENDENT ON BUILD DATE)

Release screw (1).

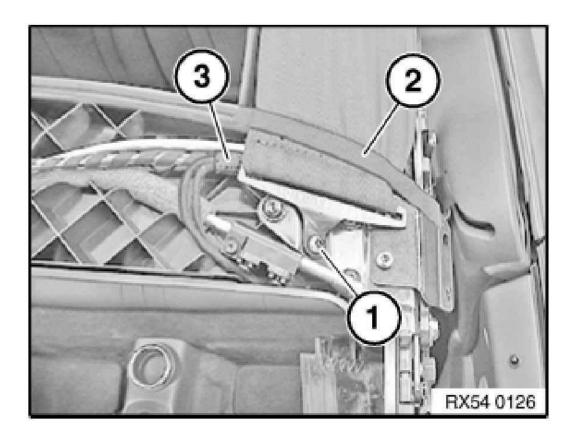
Remove tension strap from roof crossbar.

If feeding out wiring harness (3) at a later stage, if necessary detach felt strip (2) carefully from roof crossbar.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

INSTALLATION

Reattach felt strip (2).



<u>Fig. 146: Releasing Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

REMOVE ALL HALL SENSORS

Release screws on following Hall sensors and remove:

- 1. Hall sensor detects folding sunroof closed
- 2. Hall sensor detects maximum opening of folding sunroof
- 3. Hall sensor checks unlocking of retaining hook

NOTE: Release screw on Hall sensor sleeve to access Hall sensor (2 & 3).

Unlock plug connection (5) and disconnect.

Disconnect all cable ties.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Feed out wiring harness (4).

Release screws (1).

Carefully lift link (2) from frame over threaded bushes.

Disengage roof crossbar from frame.

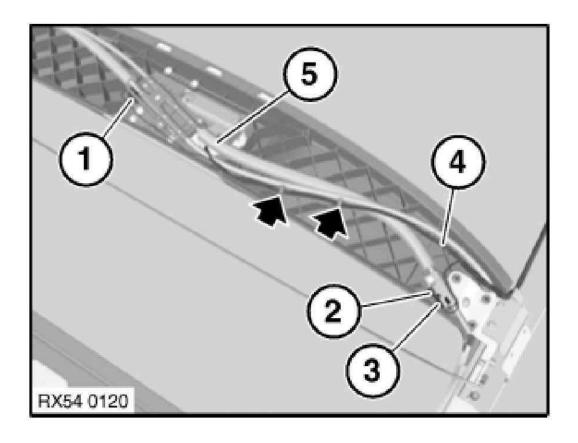
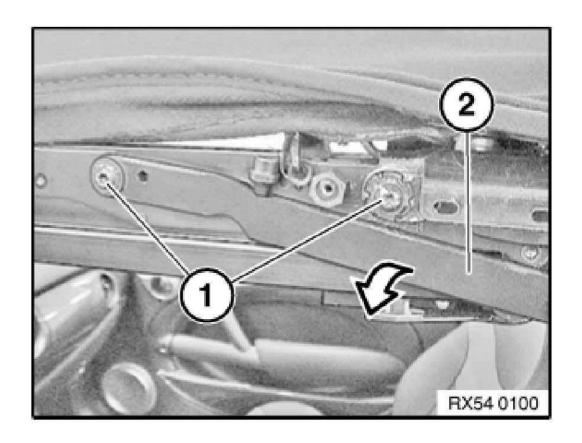


Fig. 147: Removing Hall Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 148: Lifting Link</u> Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

- 1. Ring disk
- 2. Eccentric bush
- 3. Locking pin
- 4. Screw

Bush must not rest on ring disk (inclination).

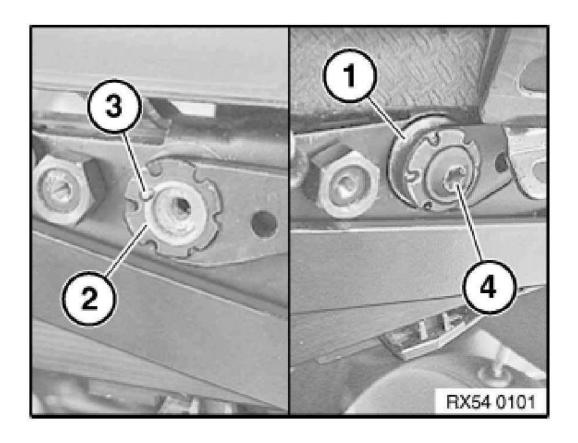
Eccentric bush must have contact with roof crossbar through ring disk.

Turn eccentric bush into position and insert locking pin.

Insert screws with Loctite.

Tightening torque $54\ 34\ 7AZ$. See <u>CONVERTIBLE TOP - TORQUE SPECIFICATIONS</u> .

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

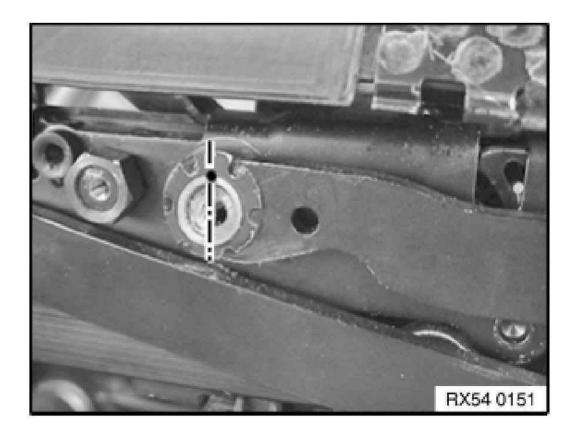


<u>Fig. 149: Installing Ring Disk, Eccentric Bush, Locking Pin And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

REPLACEMENT ONLY

- Insert eccentric bush
- Turn bore to 12 o'clock position
- Drill new hole for locking pin in roof crossbar (2 mm drill bit)
- Insert locking pin with Loctite

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 150: Turning Bore To 12 O'Clock Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

- o Adjust Hall sensors
- Check function of EH convertible top. See Checking Function Of EH Convertible Top.

54 34 400 REMOVING AND INSTALLING CONVERTIBLE TOP WIRING HARNESS

NECESSARY PRELIMINARY TASKS

- Remove complete convertible top
- Set convertible top down on **convertible top holders** and open

CONVERTIBLE TOP WIRING HARNESS OVERVIEW

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

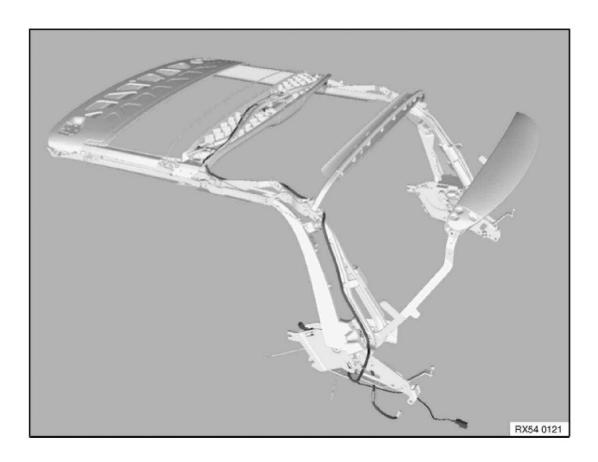


Fig. 151: Location Of Convertible Top Wiring Courtesy of BMW OF NORTH AMERICA, INC.

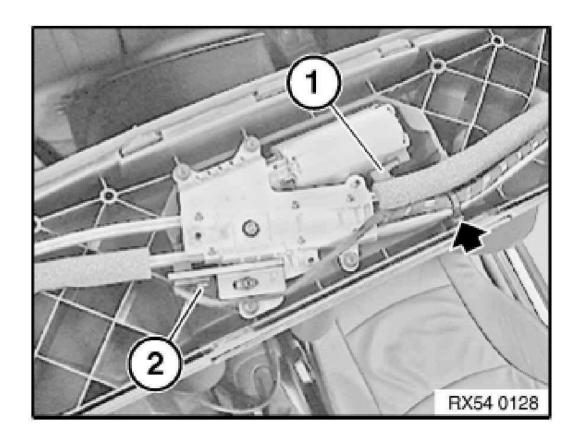
Unclip plug connection (1) and disconnect.

Detach cable strap.

Release screw (2) on Hall sensor.

Remove Hall sensor from holder.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 152: Disconnecting Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of Hall sensor sleeve before removal.

Release screw (1).

Turn Hall sensor sleeve until screws (2) are accessible.

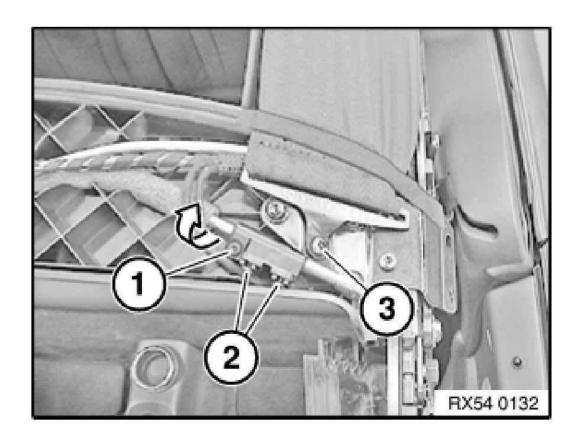
INSTALLATION

Check function and if necessary adjust Hall sensor.

Release screws (2) and remove Hall sensors.

If necessary, release screw (3) and feed wiring harness out of roof crossbar.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



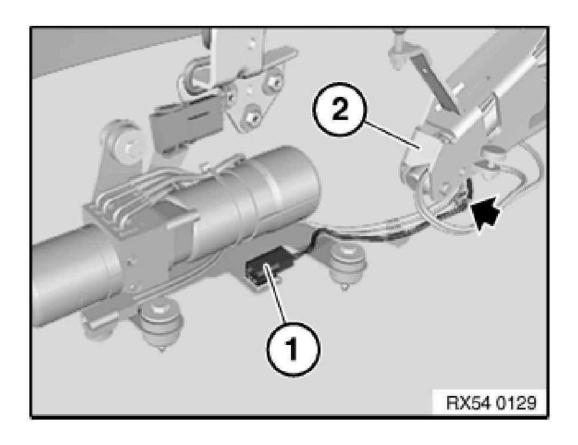
<u>Fig. 153: Turning Hall Sensor Sleeve</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug housing (1) on hydraulic pump bracket and disconnect.

Detach cable strap.

Feed wiring harness out of main bearing (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 154: Unlocking Plug Housing On Hydraulic Pump Bracket</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark position of Hall sensors before removal.

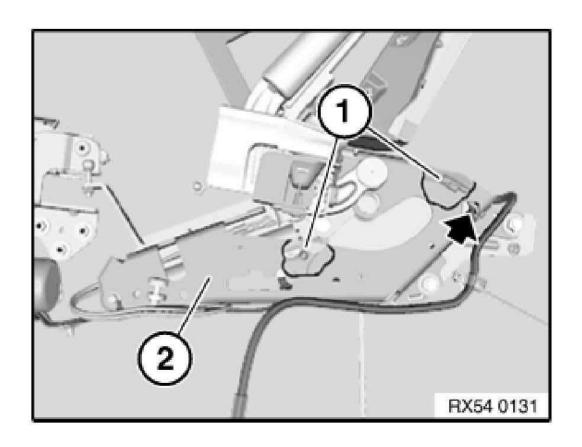
Then align new Hall sensors during installation.

Detach cable strap.

Release screws (1) on Hall sensors.

Feed wiring harness out of main bearing (2).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 155: Releasing Screws On Hall Sensors</u> Courtesy of BMW OF NORTH AMERICA, INC.

BUILD DATE UP TO 08/2005

NOTE: Left main bearing only.

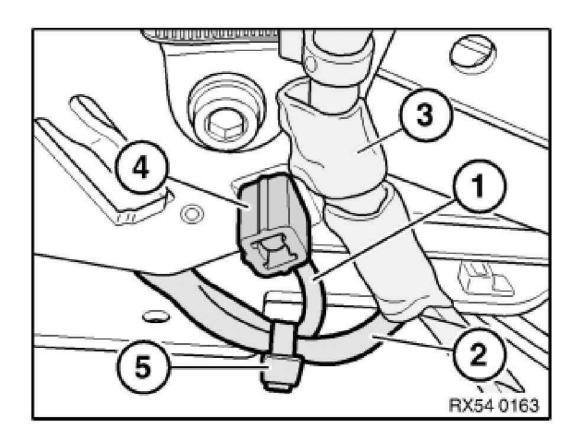
Point (4) is for orientation purposes.

Cable strap (5) is only permitted to secure line (1) to Hall sensor and line (2) to convertible top module.

IMPORTANT: Incorrectly positioned cable strap secures line to Hall sensor and convertible top module with main wiring harness (3).

Incorrectly positioned cable strap can abrade the line to the Hall sensor.

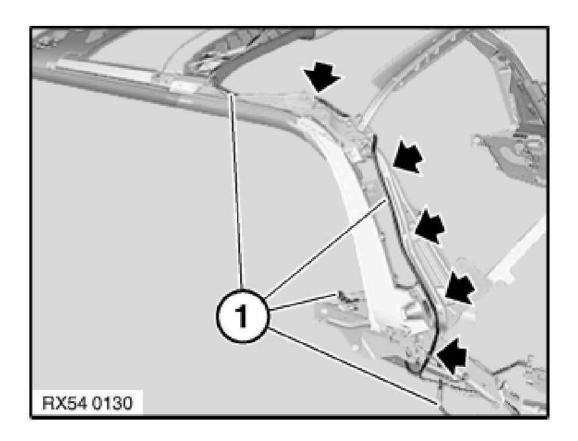
ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 156: Securing Line Hall Sensor</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect all cable straps.

Carefully complete convertible top wiring harness (1) out of convertible top frame.



<u>Fig. 157: Disconnecting Cable Straps</u> Courtesy of BMW OF NORTH AMERICA, INC.

INSTALLATION

- Replace all cable ties.
- o Make sure convertible top wiring harness is correctly routed.
- o Do not twist or kink convertible top wiring harness.
- o Make sure that entire wiring harness is not jammed in convertible top frame or linkage.
- o Convertible top wiring harness must not be under tension.
- o Carry out function test. See Checking Function Of EH Convertible Top.
- o Adjust Hall sensors

54 34 890 ADJUSTING HALL SENSORS ON ROOF CROSSBAR

NECESSARY PRELIMINARY TASKS

• Partially remove convertible top fabric

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

CHECKING SYNCHRONISM OF CLOSING LEVERS

- o Completely close complete sunroof
- o Using feeler gauge (3), measure gap (C) between retaining hook (1) and cable connection (2) from cable on left and right

If gap (C) is not identical on left and right, it must be synchronized on left and right.

Adjusting gap (C)

- Remove drive
- Move cable with screwdriver until gap (C) on left and right is identical

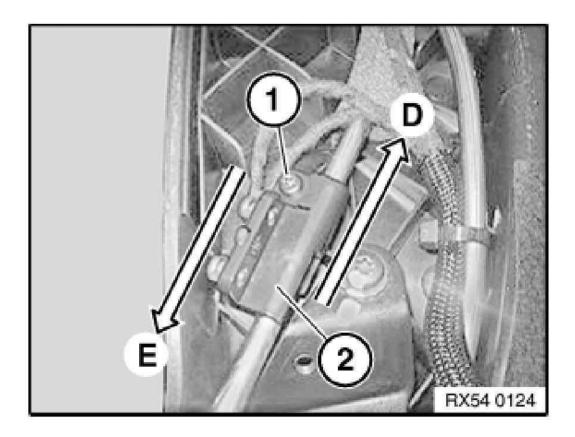


Fig. 158: Measuring Gap Between Retaining Hook And Cable Connection Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting gap (A)

Open folding sunroof completely until retaining hooks are unlocked.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Folding sunroof is in the 100 % setting.

Measure gap (A) between leading edge and slider plate:

(A) 320.6 +/- 2 mm

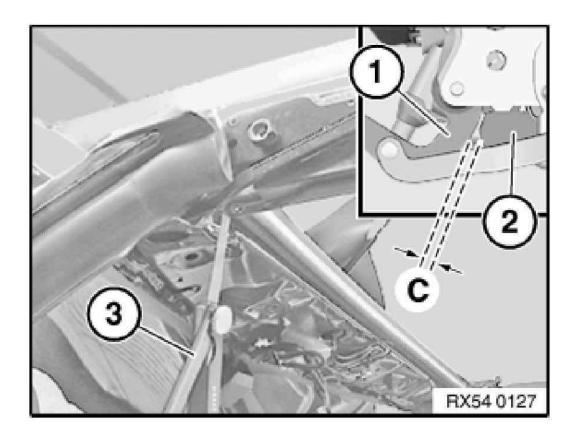


Fig. 159: Measuring Gap Between Leading Edge And Slider Plate Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: 1:1 = Gear ratio of mechanism to Hall sensor

Gap (A) above tolerance (322.6 mm):

Release screw (1).

Press Hall sensor link (2) in direction (D).

Gap (A) below tolerance (318.6 mm):

Slide Hall sensor link (2) in direction (E).

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

Tighten screw (1).

NOTE: (D)

=

Roof crossbar, inner side

(E) Roof crossbar, outer side

=

Hall sensor sleeve must not protrude out of roof crossbar.

Check gap (A) and repeat adjustment if necessary.

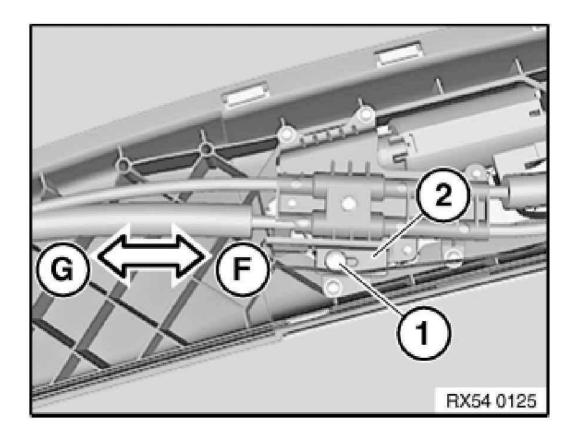


Fig. 160: Tightening Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting gap (C)

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

o Completely close complete sunroof

Using feeler gauge (3), measure gap (C) between retaining hook (1) and cable connection (2) from cable on left and right

$$(C) = 1 - 3 \text{ mm}$$

NOTE: If gap (C) is outside the tolerance or there are overlaps, this can be adjusted with the Hall sensor.

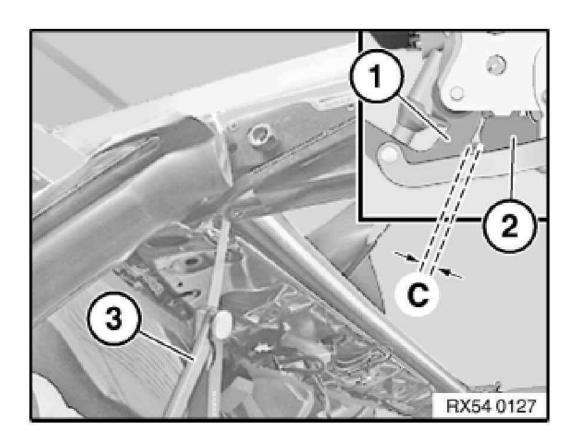


Fig. 161: Measuring Gap Between Retaining Hook And Cable Connection Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and slide holder (2) for Hall sensor in stages.

Tighten down screw (1) and completely close convertible top.

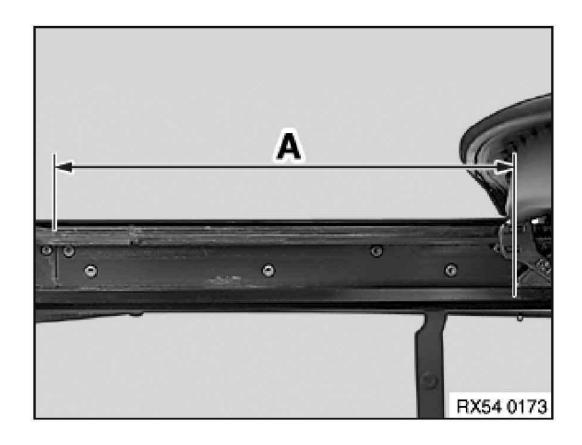
Carry out measurement.

If necessary, carry out adjustment several times until gap (C) is established.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper

(C) slide Hall s	ensor in direction (F)
> 3 mm	
(C) slide Hall sensor in direction (G)	
< 1 mm	
=	
NOTE:	(F) Roof crossbar, inner side
	=
	(G) Roof crossbar, outer side
	=
	Carry out function check. See Checking Function Of EH Convertible Top.
	Connect BMW diagnosis system.

ACCESSORIES & EQUIPMENT Convertible Top - Repair - Cooper



<u>Fig. 162: Releasing Screw And Slide Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S

2002-2008 ENGINE

Cooling & Turbocharger System - Repair Instructions - Cooper S

COOLANT CHECKING COOL

17 00... FOLLOW INSTRUCTIONS FOR WORKING ON COOLING SYSTEM

WARNING: Scalding hazard! Work on the cooling system may only be carried out on the engine after it has cooled down.

IMPORTANT: When working on oil, coolant or fuel lines, make sure no oil, coolant or fuel drips onto the alternator.

Cover alternator with suitable material.

Otherwise there may be alternator malfunctions.

IMPORTANT: Only open the cooling system when the coolant is no longer hot.

Air may enter the cooling system if it is opened while the coolant is still hot. This may cause the engine to overheat and result in permanent damage.

Recycling:

Catch and dispose of drained coolant.

Comply with the waste disposal regulations applicable in the relevant countries.

17 00 000 FITTING GUARD FOR INTERCOOLER

Special tools required:

• 11 8 480

NOTE: Before beginning repair work in the engine compartment, fit guard 11 8 480 for

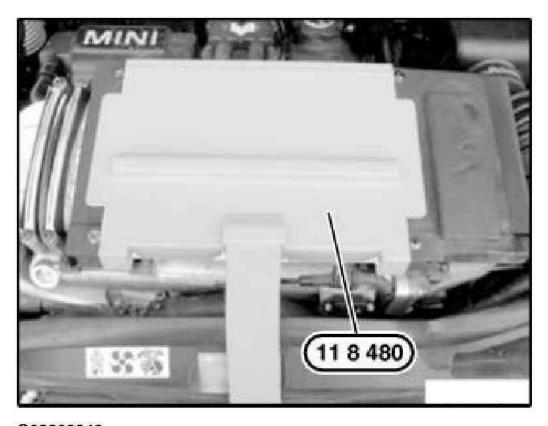
intercooler.

IMPORTANT: The guard for the intercooler must be removed when the engine is running.

Driving with the intercooler guard fitted may result in engine damage.

Fit special tool 11 8 480.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309949

Fig. 1: Installing Special Tool Courtesy of BMW OF NORTH AMERICA, INC.

The yellow ribbed belt must hang down over the front bumper to remind all personnel that the intercooler guard is fitted (e.g. when the engine hood/bonnet is closed).

17 00 005 DRAINING AND ADDING COOLANT (COOPER S)

WARNING: Work on the cooling system may only be carried out on the engine after it has cooled down.

Recycling:

Catch and dispose of drained coolant.

Comply with the waste disposal regulations applicable in the relevant countries.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S

NOTE: Follow instructions for working on cooling system. Refer to 17 00... Follow

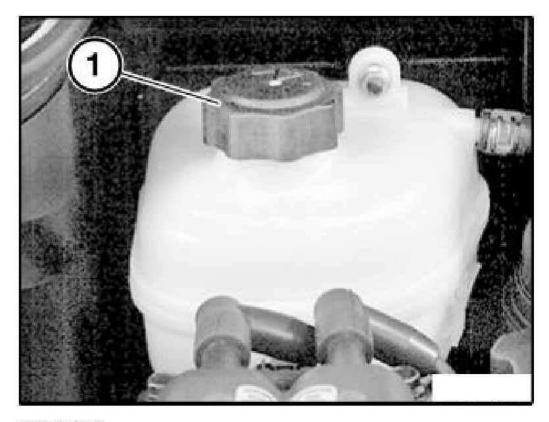
instructions for working on cooling system.

After adding coolant, vent cooling system and check for leaks. Refer to 17 00

039 Bleeding cooling system and checking for water leaks.

Draining coolant:

Screw off pressure relief cap (1) on expansion tank.



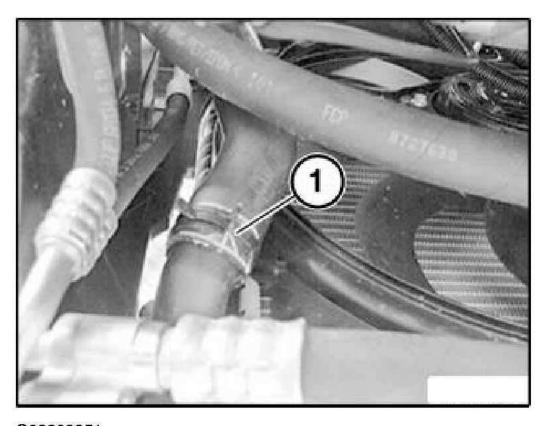
G03309950

Fig. 2: Removing Pressure Relief Cap Courtesy of BMW OF NORTH AMERICA, INC.

Remove underbody protection. Refer to <u>51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION (ENGINE)</u>.

Disconnect lower hose connection on radiator (1).

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



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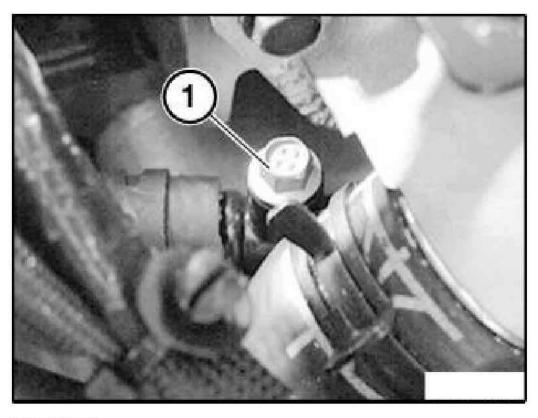
Fig. 3: Disconnecting Coolant Hose Courtesy of BMW OF NORTH AMERICA, INC.

Drain, catch and dispose of coolant.

Reattach coolant hose (1).

Release vent screw (1) in heating distributor pipe.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



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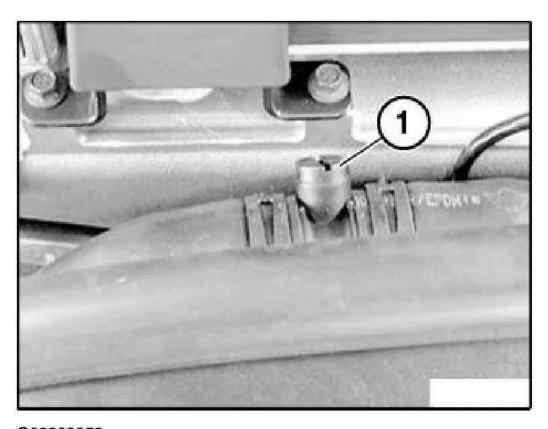
<u>Fig. 4: Releasing Heating Distributor Pipe Vent Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque 17 00 1AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES**.

Release vent screw (1) in upper radiator hose.

The cooling system is vented during filling.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



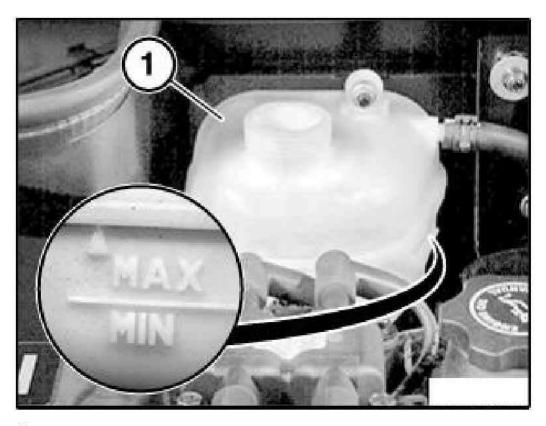
G03309953

Fig. 5: Releasing Upper Radiator Hose Vent Screw Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant:

Pour coolant into expansion tank (1).

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309954

Fig. 6: Filling Expansion Tank Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down vent screws as soon as coolant emerges.

Tightening torque 17 00 2AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES** .

Fill expansion tank up to maximum level.

Start engine and run at idle speed. Fill expansion tank if liquid level drops.

Continue running engine until liquid level stops dropping.

Switch off engine.

Fill expansion tank up to maximum level.

NOTE: Before filling, turn on ignition and set heating control to maximum temperature.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S

Set fan to sow setting. Add coolant slowly.

Use only approved coolant, refer to BMW operating fluids in Main Group 17.

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (W11)

Special tools required:

- 17 0 002
- 17 0 008
- 17 0 051
- 17 0 052

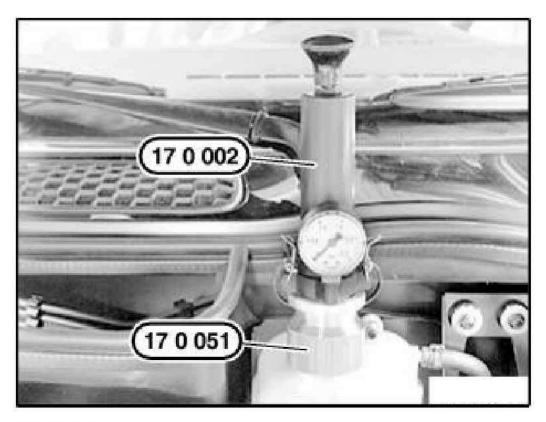
WARNING: Risk of burning and scalding!
Only perform this work after engine has cooled down.

Checking pressure drop in cooling system:

Remove cap from expansion tank.

Connect special tool 17 0 051 to expansion tank. Connect special tool 17 0 002.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309955

<u>Fig. 7: Connecting Special Tool To Expansion Tank</u> Courtesy of BMW OF NORTH AMERICA, INC.

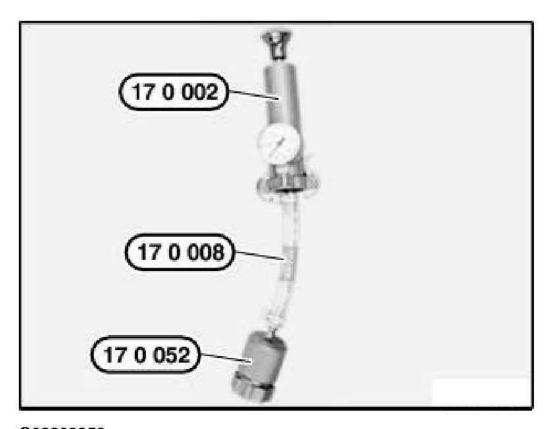
Pressurize cooling system to 1.5 bar and wait approx. 2 minutes.

Cooling system is tight if pressure drop does not exceed 0.1 bar.

Checking pressure relief valve in cap:

Remove rubber seal from special tool 17 0 002.

Connect special tools 17 0 052, 17 0 008 and 17 0 002 to cap.



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<u>Fig. 8: Connecting Special Tools To Pressurize Cap</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pressurize cap.

Opening gauge pressure must be 0.89 - 1.20 bar.

17 00 010 CHECKING FOR LEAKS BETWEEN COOLING SYSTEM AND COMBUSTION CHAMBER

CAUTION: Checking for leaks while the engine is running creates the risk of engine overheating.

Observe coolant temperature.

R50:

Remove pressure cap from fill tower.

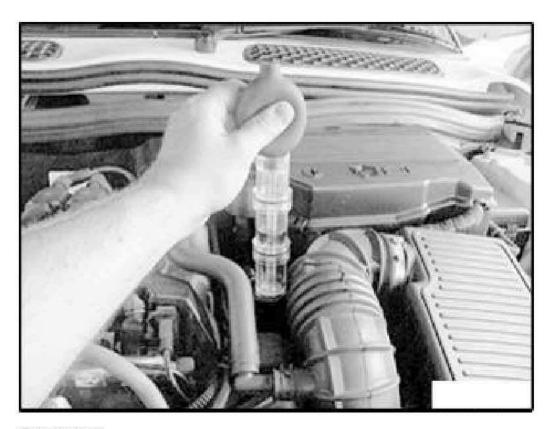
2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S

Check for leaks with CO2 leak tester.

R53:

Remove pressure cap from expansion tank.

Check for leaks with CO2 leak tester.



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Fig. 9: Checking For Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

Follow equipment manufacturer's operating instructions.

17 00 039 BLEEDING COOLING SYSTEM AND CHECKING FOR WATER LEAKS

WARNING: Danger of scalding - only remove cover when engine has cooled down.

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Checking coolant level

Allow engine to cool down before checking coolant level.

Coolant temperature must not be more than 30 °C.

If ambient temperature exceeds 30°C, wait until engine has cooled down to ambient temperature.

Use only recommended coolant, refer to BMW Operating Fluids.

Check coolant level and top up if necessary.

- Add coolant, refer to 17 00 005 Draining and adding coolant (COOPER S)
- Checking cooling system for water leaks, refer to 17 00 009 Checking cooling system for leaks (W11)

ENGINE RADIATOR WITH ATTACHMENT

17 11 000 REMOVING AND INSTALLING RADIATOR

WARNING: Danger of scalding!

Only carry out work on the cooling system after the engine has cooled

down!

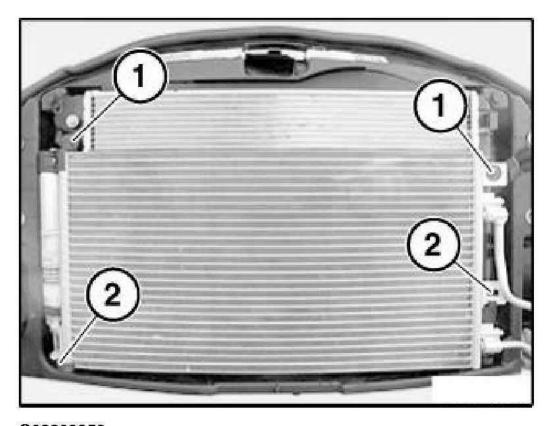
Necessary preliminary tasks:

- Switch off ignition
- Drain coolant, refer to 17 00 005 Draining and adding coolant (COOPER S)
- Remove front carrier, refer to <u>51 11 050 REMOVING AND INSTALLING/REPLACING CARRIER</u> FOR FRONT BUMPER TRIM
- Remove oil cooler, if fitted (ECVT only)
- Remove upper radiator hose

IMPORTANT: Make sure without fail that coolant hoses are correctly routed, risk of damage by sharp edges or abrasion.

Remove retaining screws (1) of condenser and lift condenser out of fixture/retaining lug (2).

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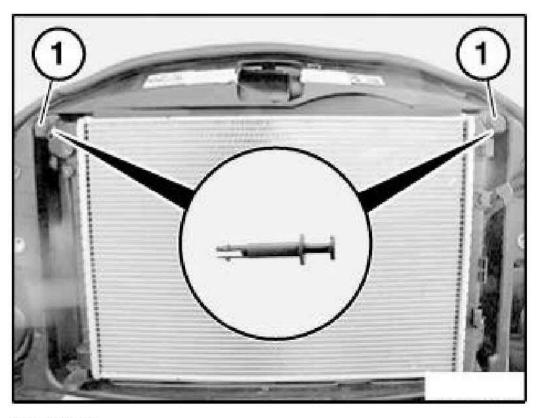
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Fig. 10: Removing Condenser Courtesy of BMW OF NORTH AMERICA, INC.

Work carefully so as not to damage connected lines.

Remove upper radiator hose.

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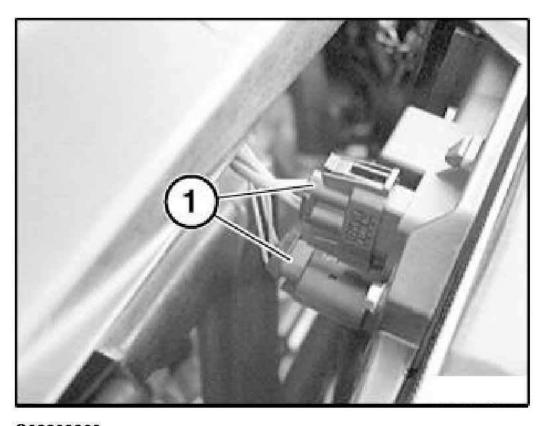
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Fig. 11: Removing Radiator Retaining Pins Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining pins (1) of radiator.

Tilt upper radiator forwards.

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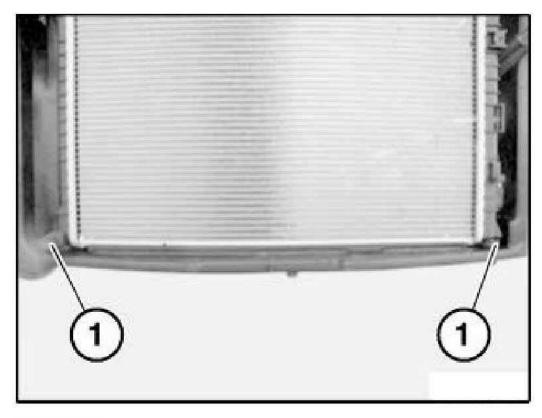
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Fig. 12: Disconnecting Wiring Harness From Fan Relay Block Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect wiring harness from fan relay block (1).

Lift radiator out of lower fixtures (1).

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G03309961

Fig. 13: Removing Radiator From Lower Fixtures Courtesy of BMW OF NORTH AMERICA, INC.

17 11 001 REPLACING RADIATOR

For procedure.

17 11 031 REMOVING AND INSTALLING/REPLACING FAN COWL

Necessary preliminary tasks:

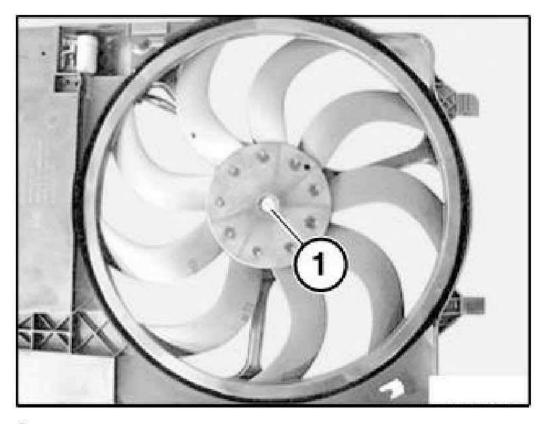
• Remove fan cowl with electric fan, refer to 17 11 035 Removing and installing/replacing fan cowl with electric fan (W10, W11)

IMPORTANT: Make sure without fail that coolant hoses are correctly routed, risk of damage by sharp edges or abrasion.

NOTE: Nut (1) for fan blade has a left-hand thread.

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Unscrew nut (1).



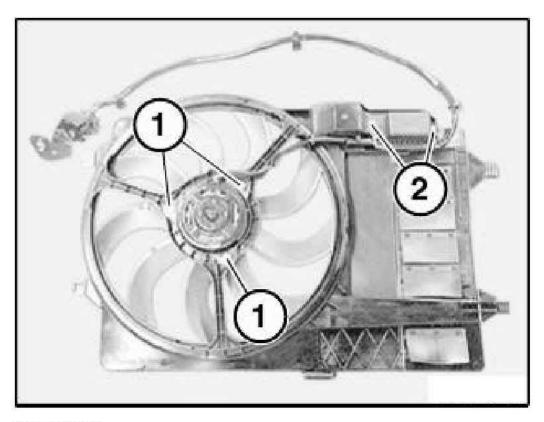
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Fig. 14: Removing Fan Blade Nut Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque 17 11 1AZ. Refer to $\underline{\textbf{COOLING SYSTEM - TIGHTENING TORQUES}}$.

Undo screws (1) for fan motor and screws (2) for series resistor block.

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G03309963

Fig. 15: Removing Components
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fan motor, series resistor block and fan shroud.

Installation:

Fit wiring loom correctly.

If fitted, do not remove metal tabs (balance weight) on fan wheel (imbalance).

Tightening torque 17 11 2AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES**.

17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (W10, W11)

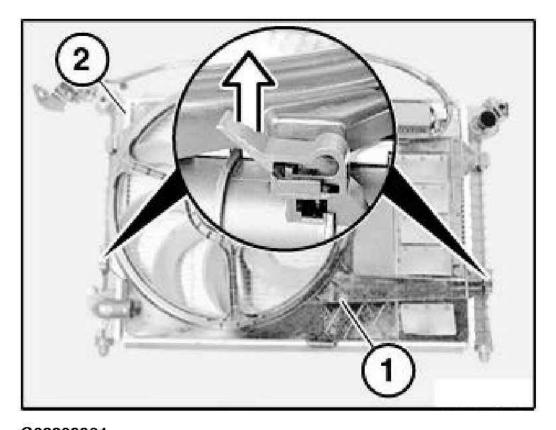
Necessary preliminary tasks:

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• Remove radiator, refer to 17 11 000 Removing and installing radiator

IMPORTANT: Make sure without fail that coolant hoses are correctly routed, risk of damage by sharp edges or abrasion.

Unclip fan housing (1) on radiator (2) and move upward.



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Fig. 16: Removing Fan Cowl Courtesy of BMW OF NORTH AMERICA, INC.

Remove fan cowl with electric fan.

OIL COOLER

17 21 500 FLUSHING OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

Special tools required:

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S

- 17 2 018
- 17 2 019

NOTE: Carry out the work steps listed when:

Fitting a new or replacement transmission

Flushing can only be carried out with the automatic transmission removed.

Procedure:

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect the connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Feed open end of drain line into a suitable collection container.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to) through oil lines and oil cooler.

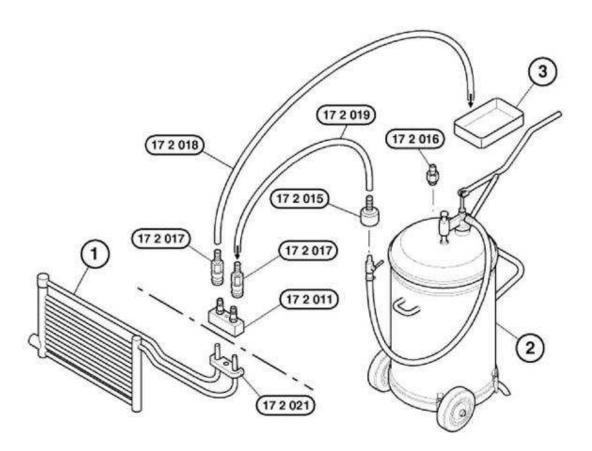
Reposition quick -release couplings.

Flush oil lines/oil cooler in opposite direction with approx. 1 liter of transmission fluid (refer to BMW Service Operating Fluids).

Disconnect quick -release couplings, remove adapters.

NOTE: Dispose of flushing oil properly; do not under any circumstances reuse it.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S

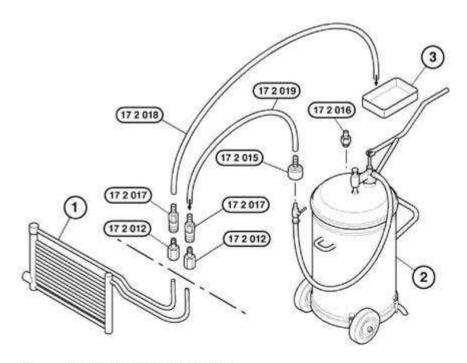


- Transmission-oil cooler with lines
- 2) Oil collection unit
- Oil drip tray
- 17 2 011 Adapter for connecting transmission-side oil cooler lines (1)
- 17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
- 17 2 016 Connection for oil collection unit (2), manufacturer: Horn
- 17 2 017 Quick-release coupling (2 pieces)
- 17 2 018 Hose to oil drip tray (3)
- 17 2 019 Hose to oil collection unit (2)
- 17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z G03309965

Fig. 17: Arrangement Of Flushing Device For Transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z, GA6HP26Z

Courtesy of BMW OF NORTH AMERICA, INC.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S

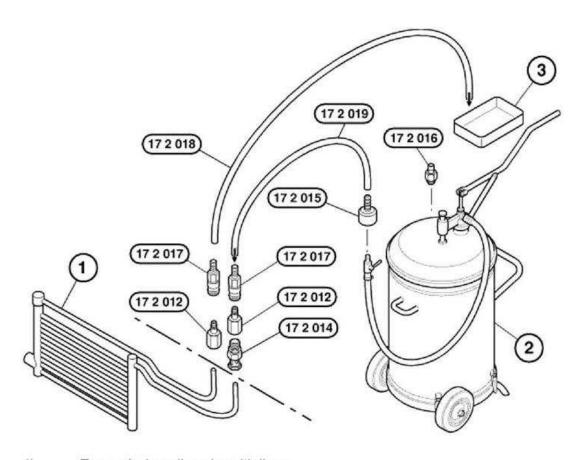


- 1) Transmission-oil cooler with lines
- Oil collection unit
- 3) Oil drip tray
- 17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)
- 17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
- 17 2 016 Connection for oil collection unit (2), manufacturer: Horn
- 17 2 017 Quick-release coupling (2 pieces)
- 17 2 018 Hose to oil drip tray (3)
- 17 2 019 Hose to oil collection unit (2)

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Fig. 18: Arrangement Of Flushing Device For Transmission A4S 310R) Courtesy of BMW OF NORTH AMERICA, INC.

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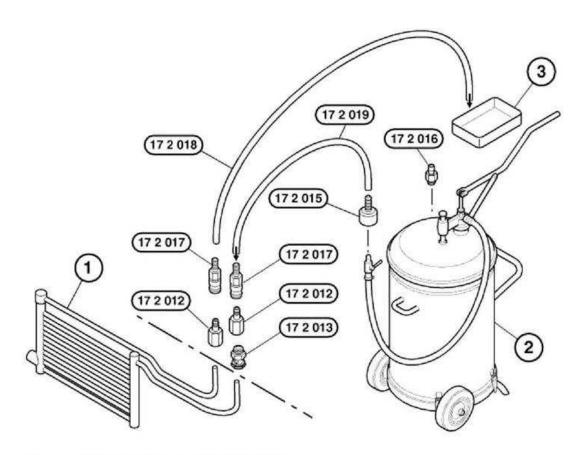


- 1) Transmission-oil cooler with lines
- 2) Oil collection unit
- Oil drip tray
- 17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)
- 17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)
- 17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
- 17 2 016 Connection for oil collection unit (2), manufacturer: Horn
- 17 2 017 Quick-release coupling (2 pieces)
- 17 2 018 Hose to oil drip tray (3)
- 17 2 019 Hose to oil collection unit (2)

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<u>Fig. 19: Arrangement Of Flushing Device For Transmission A4S 300J</u> Courtesy of BMW OF NORTH AMERICA, INC.

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- 1) Transmission-oil cooler with lines
- 2) Oil collection unit
- 3) Oil drip tray
- 17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)
- 17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)
- 17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
- 17 2 016 Connection for oil collection unit (2), manufacturer: Horn
- 17 2 017 Quick-release coupling (2 pieces)
- 17 2 018 Hose to oil drip tray (3)
- 17 2 019 Hose to oil collection unit (2)

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Fig. 20: Arrangement Of Flushing Device For Transmission A5S 440Z Courtesy of BMW OF NORTH AMERICA, INC.

OIL COOLER WITH LINES

17 21 500 FLUSHING OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S

For procedure, refer to 17 21 500 Flushing oil cooler with lines (automatic transmission).

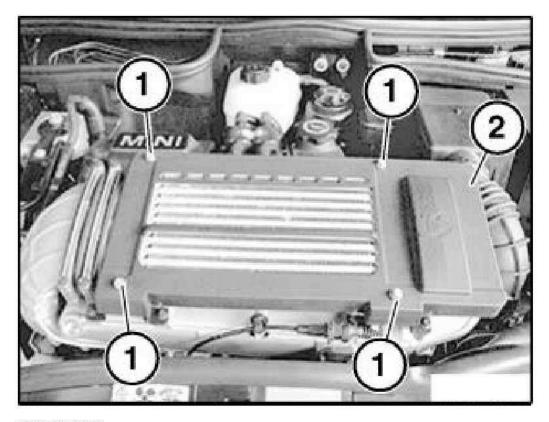
CHARGE AIR COOLER WITH MOUNT

17 51 000 REMOVING AND INSTALLING/REPLACING INTERCOOLER

IMPORTANT: Intercooler sealing rings may only be installed in clean and dry condition.

Do not lubricate seals.

Unscrew mounting bolts (1) from intercooler cover.



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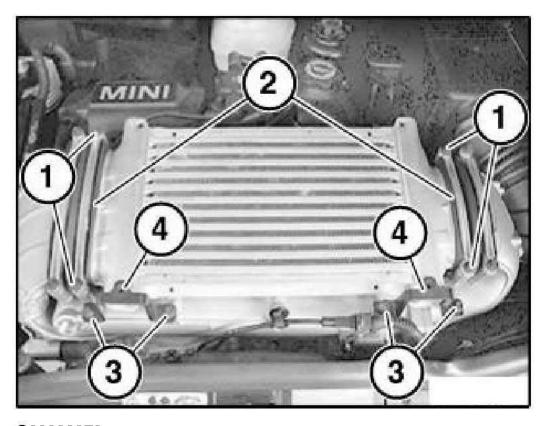
<u>Fig. 21: Removing Intercooler Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove intercooler cover (2).

Tightening torque 17 51 1AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES**.

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Remove screws (1) from brackets for sealing rings and remove upper brackets (2).



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Fig. 22: Removing Brackets
Courtesy of BMW OF NORTH AMERICA, INC.

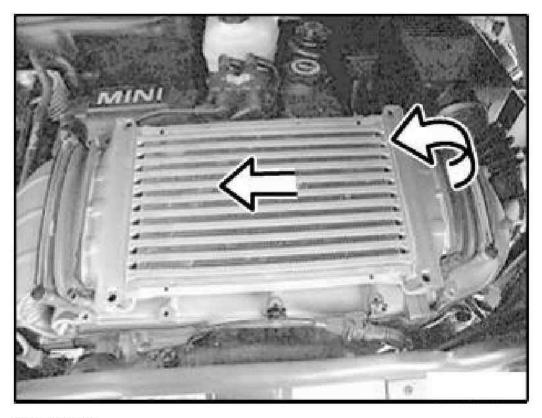
Remove screws (3) from brackets for intercooler and remove brackets (4).

Tightening torque 17 51 2AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES** .

Tightening torque 17 51 3AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES**.

Remove intercooler from right side.

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<u>Fig. 23: Removing Intercooler From Right Side</u> Courtesy of BMW OF NORTH AMERICA, INC.

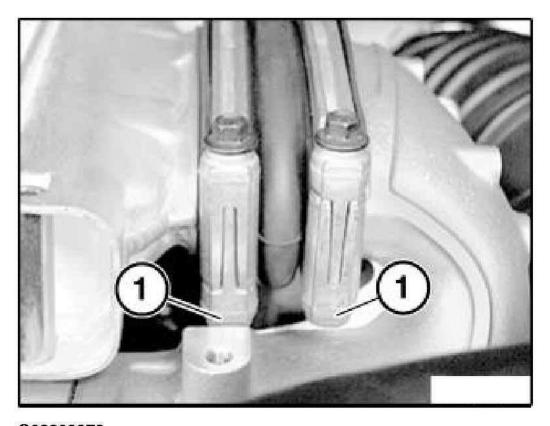
NOTE: Inspect sealing rings for cracks and damage and replace if necessary.

Installation:

Make sure intercooler sealing rings are correctly seated.

Secure sealing ring holders (1) fitted with threads to underside.

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Fig. 24: Securing Sealing Ring Holders
Courtesy of BMW OF NORTH AMERICA, INC.

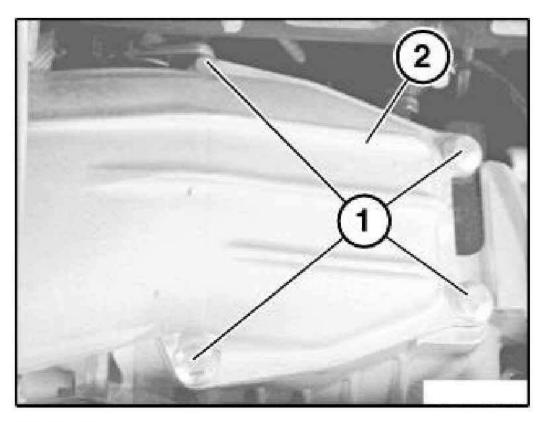
17 51 080 REMOVING AND INSTALLING/REPLACING TURBOCHARGER EXHAUST PIPE (RIGHT)

Remove left turbocharger exhaust pipe. Refer to <u>17 51 085 Removing and installing/replacing pipe between intercooler and intake manifold (left)</u>.

Remove intake manifold. Refer to <u>11 61 051 REMOVING AND INSTALLING INTAKE MANIFOLD</u> (COOPER S).

Release bolts (1) and remove turbocharger exhaust pipe (2).

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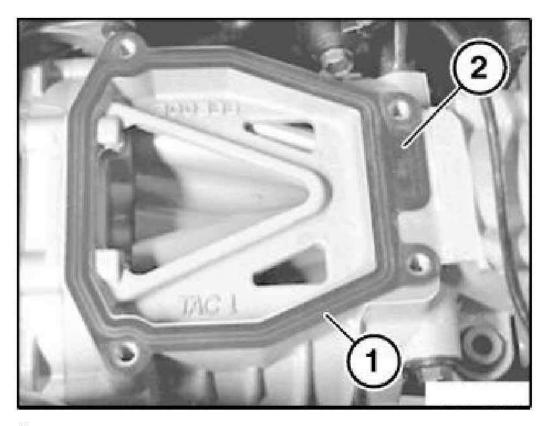
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<u>Fig. 25: Removing Turbocharger Exhaust Pipe</u> Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque 17 51 4AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES** .

Install new gasket (1) as shown so that TOP lettering (2) is can be read.

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Fig. 26: Installing Gasket Courtesy of BMW OF NORTH AMERICA, INC.

17 51 085 REMOVING AND INSTALLING/REPLACING PIPE BETWEEN INTERCOOLER AND INTAKE MANIFOLD (LEFT)

Disconnect battery. Refer to 12 00 DISCONNECTING AND CONNECTING BATTERY.

Remove throttle. Refer to 13 54 030 REMOVING AND INSTALLING/SEALING THROTTLE ASSEMBLY (COOPER S).

Remove intercooler. Refer to 17 51 000 Removing and installing/replacing intercooler.

Lever out hose clamp (1) with screwdriver in direction of arrow.

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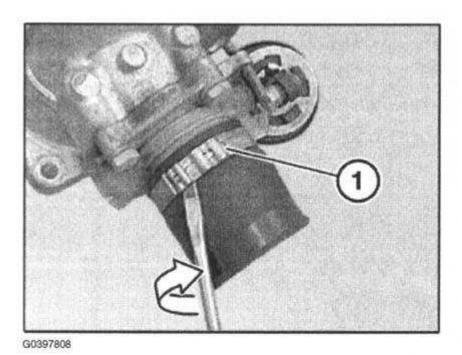
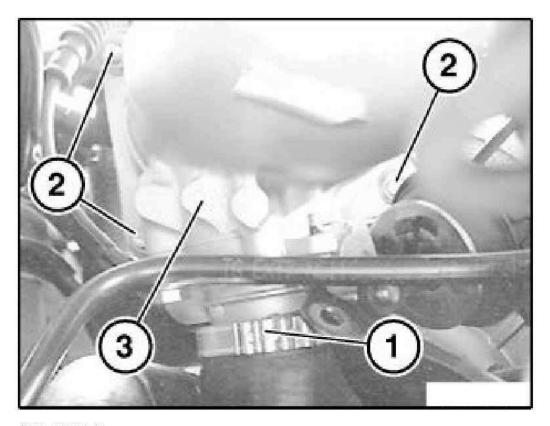


Fig. 27: Levering Out Hose Clamp Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration shows removed air duct.

Unscrew housing retaining nuts (2).

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<u>Fig. 28: Removing Housing</u> Courtesy of BMW OF NORTH AMERICA, INC.

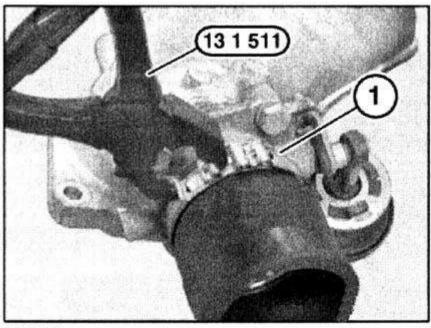
Remove housing (3).

Replace seal.

Tightening torque 17 51 5AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES** .

Secure hose clamp (1) with special tool 13 1 511.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G00397809

Fig. 29: Securing Hose Clamp Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration shows removed air duct.

Assemble engine.

17 51 090 REMOVING AND INSTALLING OR REPLACING TURBOCHARGER INLET PIPE

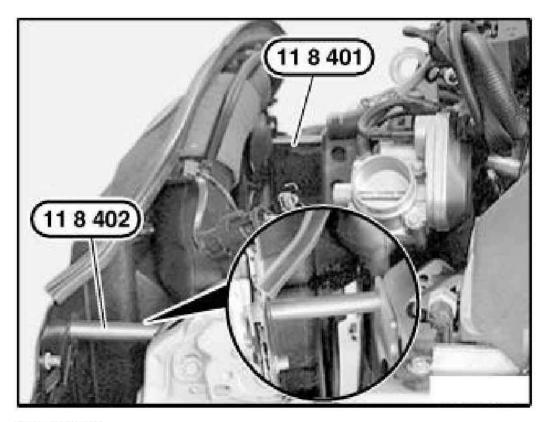
Special tools required:

- 11 8 401
- 11 8 402

Remove impact tube. Refer to 31 11 020 Removing and installing/replacing bumper bracket.

Lower front end module and attach special tools 11 8 401 and 11 8 402.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



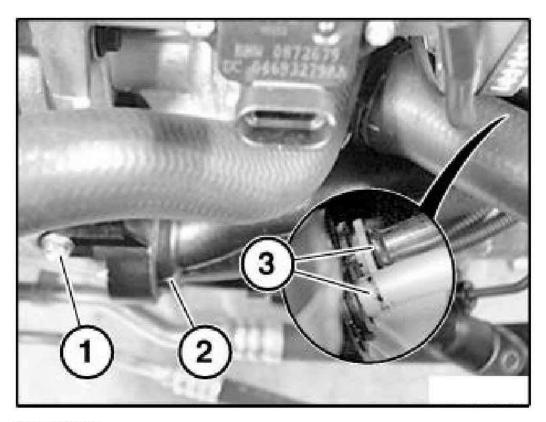
G03309976

Fig. 30: Attaching Special Tool Courtesy of BMW OF NORTH AMERICA, INC.

Remove pipe from intercooler to intake manifold. Refer to <u>17 51 085 Removing and installing/replacing pipe between intercooler and intake manifold (left)</u>.

Remove retaining bolt (1) for turbocharger inlet.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309977

Fig. 31: detaching Turbocharger Inlet Pipe From Feed Lines Courtesy of BMW OF NORTH AMERICA, INC.

Detach turbocharger inlet pipe (2) from feed lines (3).

NOTE: Release pipes at quick -release couplings.

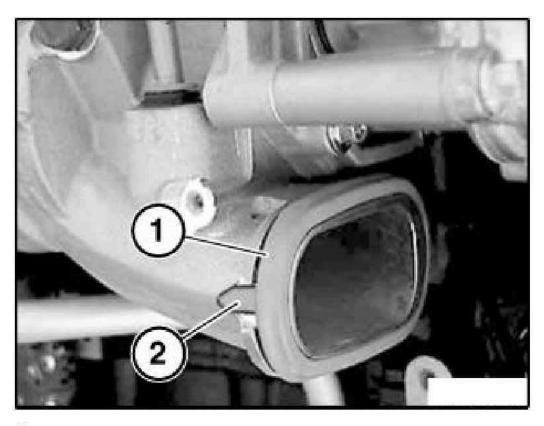
Tightening torque 11 65 1AZ. Refer to **ENGINE - TIGHTENING TORQUES**.

Check sealing ring (1) for damage.

NOTE: Guide lug (2).

Replace sealing ring if damaged.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309978

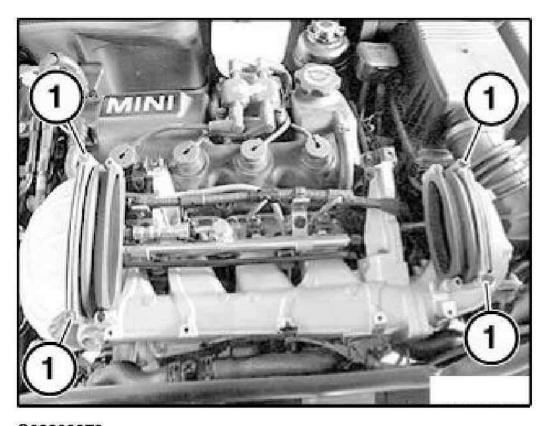
Fig. 32: Checking Sealing Ring Courtesy of BMW OF NORTH AMERICA, INC.

17 51 100 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SEALING RINGS ON INTERCOOLER

Remove intercooler. Refer to 17 51 000 Removing and installing/replacing intercooler.

Unscrew retaining screws (1) of sealing ring brackets on left and right sides, remove brackets and sealing rings.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309979

Fig. 33: Removing Brackets & Seals Courtesy of BMW OF NORTH AMERICA, INC.

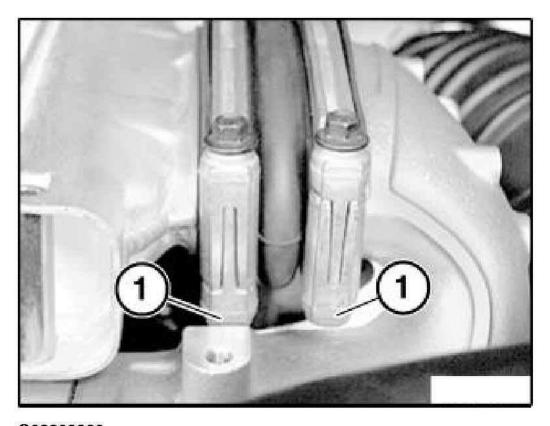
Replace sealing rings.

Tightening torque 17 51 2AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES** .

Installation:

Before installing sealing ring, first place sealing ring bracket on left side of intercooler on sealing ring.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309980

<u>Fig. 34: Aligning Brackets And Threads</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check that sealing rings and brackets are correctly positioned.

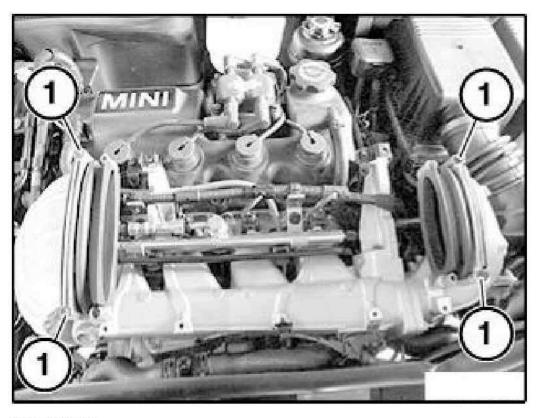
Pay attention to alignment of brackets and threads on underside.

17 51 104 REMOVING AND INSTALLING/REPLACING SEALING RINGS ON INTERCOOLER

Remove intercooler. Refer to 17 51 000 Removing and installing/replacing intercooler.

Remove screws (1) from brackets for sealing rings, remove brackets and sealing rings.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309981

Fig. 35: Removing Brackets & Seals Courtesy of BMW OF NORTH AMERICA, INC.

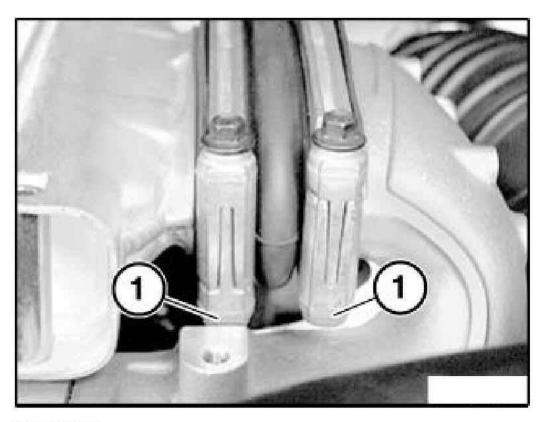
Replace sealing rings.

Tightening torque 17 51 2AZ. Refer to **COOLING SYSTEM - TIGHTENING TORQUES** .

Installation:

Before installing sealing ring, first place sealing ring bracket on left side of intercooler on sealing ring.

2002-2008 ENGINE Cooling & Turbocharger System - Repair Instructions - Cooper S



G03309982

Fig. 36: Aligning Brackets And Threads Courtesy of BMW OF NORTH AMERICA, INC.

Check that sealing rings and brackets are correctly positioned.

Pay attention to alignment of brackets and threads on underside (1).

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2007-09 ENGINE

Cooling System - Repair Instructions - Cooper

00 COOLANT, CHECKING COOLING SYSTEM

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

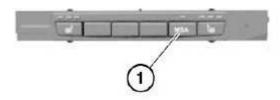
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 1: Passenger Compartment Button Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

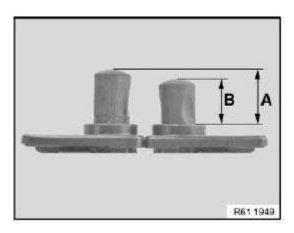


Fig. 2: Engine Hood/Bonnet Contact Setting Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

17 00 ... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM

WARNING: Scalding hazard!

Only carry out work on the cooling system after the engine has cooled

down!

IMPORTANT: Wear protective gloves and goggles.

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine.

IMPORTANT: When working on the oil, coolant or fuel circuit, protect the alternator against contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Do not fill coolant expansion tank over MAX level as overfilling will cause the

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leakages.

IMPORTANT: Make sure without fail that coolant hoses are correctly routed. Risk of damage due to sharp edges or chafing.

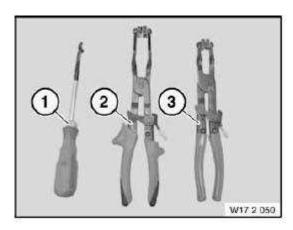
Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Special tool kit 17 2 050 for removing and installing spring band clamps for coolant hoses.

- o (1) Release tool
- o (2) Pliers (bent version)
- o (3) Pliers (straight version)



<u>Fig. 3: Release Tool, Pliers (Bent Version) And Pliers (Straight Version)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release spring band clamp (1) with pliers (2).

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

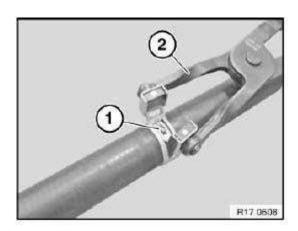
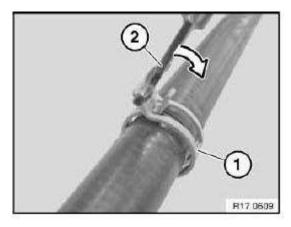


Fig. 4: Spring Band Clamp And Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock spring band clamp (1) with release tool (2).



<u>Fig. 5: Unlocking Spring Band Clamp With Release Tool</u> Courtesy of BMW OF NORTH AMERICA, INC.

17 00 005 DRAINING AND ADDING COOLANT (N12)

Special tools required:

• 17 2 051 **17 2 050 PLIERS SET**

WARNING: Danger of scalding!

Only carry out work on the cooling system after the engine has cooled

down!

IMPORTANT: Wear protective gloves and goggles.

Necessary preliminary tasks:

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

Follow instructions for working on cooling system, see 17 00 ... Instructions for working on cooling system.

After adding coolant, check cooling system for water leaks.

Draining coolant:

Unscrew cap (1) on coolant expansion tank.

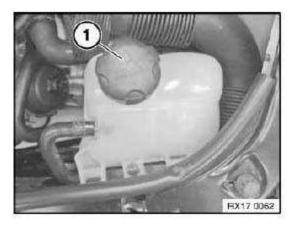


Fig. 6: Coolant Expansion Tank Cap Courtesy of BMW OF NORTH AMERICA, INC.

Release spring strap on lower coolant hose (1) with special tool 17 2 051.

Detach coolant hose (1). Drain, catch and dispose of coolant.

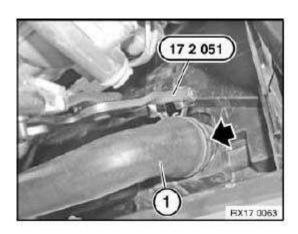


Fig. 7: Locating Coolant Hose Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant:

Before filling, turn on ignition and set heating control to maximum temperature. NOTE:

Set fan to sow setting.

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

Pour in coolant slowly.

Observe mixture ratio.

The cooling system is vented during filling.

NOTE:

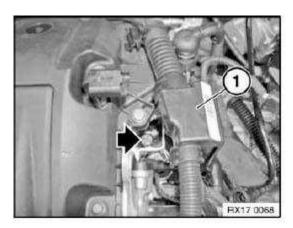
- Installation location of vent screw: thermostat housing.
- For purposes of clarity, illustration shows and text refers to released cable duct (1).

Release vent screw

Pour in special coolant through expansion tank filler neck until bubble-free coolant emerges at vent screw.

Close vent screw.

Tightening torque 17 00 1AZ . See **COOLING SYSTEM - TIGHTENING TORQUES -- COOPER (N12 ENGINE)** .



<u>Fig. 8: Locating Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Continue topping up coolant in expansion tank to max. level (1).

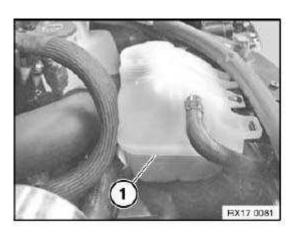
Start engine and run at idle speed.

If the level drops, top up coolant until the level no longer drops.

Switch off engine and if necessary top up coolant to max. level.

Close expansion tank.

2007-09 ENGINE Cooling System - Repair Instructions - Cooper



<u>Fig. 9: Coolant Max. Level In Expansion Tank</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cooling system for leaks, see <u>17 00 009 Checking cooling system for</u> leaks (N12, N14)

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N12, N14)

Special tools required:

- 17 0 101 <u>17 0 100 TESTER</u>
- 17 0 102 **17 0 100 TESTER**
- 17 0 109 **17 0 100 TESTER**
- 17 0 115 **17 0 100 TESTER**

WARNING: Risk of burning and scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine!

Necessary preliminary tasks:

Follow instructions for working on cooling system, see 17 00 ... Instructions for working on cooling system.

Checking pressure drop in cooling system:

Unscrew cap from filler neck.

Connect special tool 17 0 109 to filler neck.

Connect special tools 17 0 102 and 17 0 101.

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

Build up gauge pressure and wait approx. 2 minutes, see <u>17 11 RADIATOR AND MOUNTING PARTS</u> <u>R56 / R55 / N12 / N14 / W16</u>

Cooling system is tight if pressure drop does not exceed 0.1 bar.

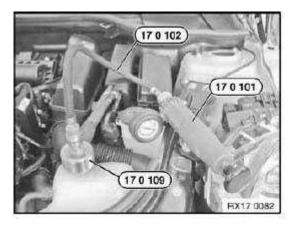


Fig. 10: Special Tools (17 0 109), (17 0 101) And (17 0 102) Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap:

Connect special tool 17 0 115 to cap (1).

Connect special tools $17\ 0\ 101$ and $17\ 0\ 102$.

Pressurize cap.

Compare opening pressure of pressure relief valve, see <u>17 11 RADIATOR AND MOUNTING PARTS R56 / R55 / N12 / N14 / W16</u>

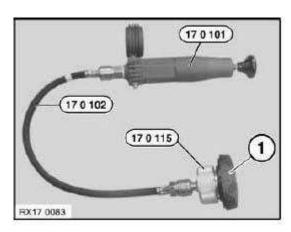


Fig. 11: Cap And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR WATER LEAKS

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

WARNING: Danger of scalding! Only remove cap when engine has cooled down.

The cooling system is vented during filling.

This operation is described in **DRAINING AND ADDING COOLANT**.

Check cooling system for leaks, see <u>17 00 009 Checking cooling system for leaks (N12, N14)</u>

Checking coolant level:

Allow engine to cool down before checking coolant level.

Coolant temperature must not be more than 30°C.

If ambient temperature exceeds 30°C, wait until engine has cooled down to ambient temperature.

Top up coolant, see 17 00 005 Draining and adding coolant (N12)

11 ENGINE RADIATOR WITH ATTACHMENT

17 11 000 REMOVING AND INSTALLING RADIATOR (N12)

Special tools required:

• 17 2 052 **17 2 050 PLIERS SET**

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

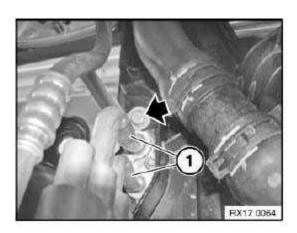
Necessary preliminary tasks:

- Switch off ignition
- Remove carrier for bumper trim at front, see <u>51 11 050 REMOVING AND</u> INSTALLING/REPLACING CARRIER FOR FRONT BUMPER TRIM
- Drain coolant, see 17 00 005 Draining and adding coolant (N12)

IMPORTANT: Make sure without fail that coolant hoses are correctly routed, risk of damage by sharp edges or abrasion.

Release retaining screws for refrigerant lines (1) on front panel.

2007-09 ENGINE Cooling System - Repair Instructions - Cooper



<u>Fig. 12: Locating Refrigerant Lines Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and carefully tilt condenser (1) towards front.

IMPORTANT: Secure condenser without fail against falling out and against bending of lines.

Bent lines can cause leaks!

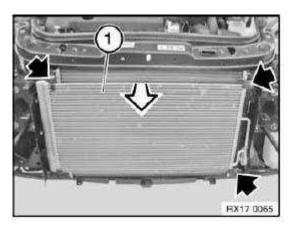


Fig. 13: Condenser Courtesy of BMW OF NORTH AMERICA, INC.

Unclip radiator (1) at top left and right and tilt towards front.

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

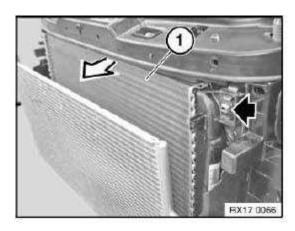


Fig. 14: Removing Radiator At Top Left And Right Courtesy of BMW OF NORTH AMERICA, INC.

Release spring straps of both coolant hoses (1) with special tool 17 2 052.

Detach coolant hoses (1), carefully feed out radiator (2) towards top and remove.

Do not damage the condenser in the process.

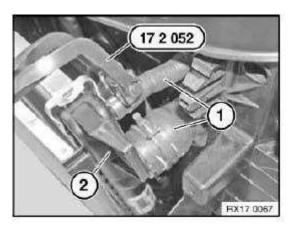


Fig. 15: Coolant Hoses, Radiator And Special Tools (17 2 052) Courtesy of BMW OF NORTH AMERICA, INC.

17 11 001 REPLACING RADIATOR

Operation is identical to:

Removing and installing/replacing fan shroud with electric fan.

17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N12)

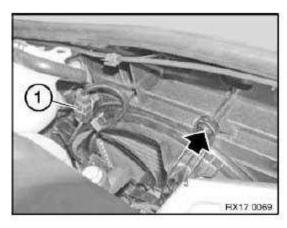
WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

Unlock plug (1) and remove.

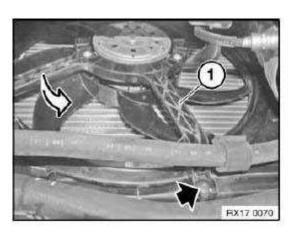
Release screw.



<u>Fig. 16: Locating Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw.

Unlock fan cowl duct (1) in direction of arrow and remove.



<u>Fig. 17: Unlocking Fan Cowl Duct</u> Courtesy of BMW OF NORTH AMERICA, INC.

17 11 100 REMOVING AND INSTALLING/REPLACING COOLANT EXPANSION TANK (N12, N14)

Special tools required:

• 17 2 052 <u>17 2 050 PLIERS SET</u>

NOTE: Follow instructions for working on cooling system, see 17 00 ... Instructions for working on cooling system

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

IMPORTANT: Make sure without fail that coolant hoses are correctly routed. Risk of damage due to sharp edges or chafing.

Release spring strap for hose (1) with special tool 17 2 052 and detach hose (1).

Release screw (2).

Release expansion tank (3) from rubber mount and raise slightly until lower coolant hose is accessible.

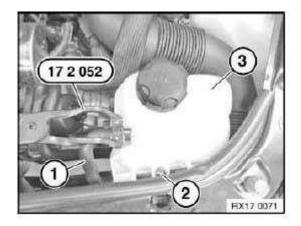


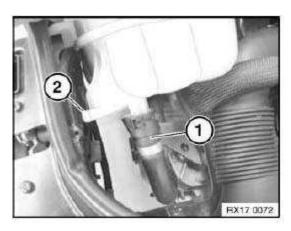
Fig. 18: Hose, Screw And Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach lower coolant hose (1). Catch and dispose of escaping coolant.

Remove expansion tank.

Installation:

Make sure bearing pin (2) is installed in correct position in rubber mount.



<u>Fig. 19: Lower Coolant Hose And Bearing Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

2007-09 ENGINE Cooling System - Repair Instructions - Cooper

NOTE: Check coolant level, see <u>17 00 005 Draining and adding coolant (N12)</u>

2007 ACCESSORIES AND EQUIPMENT Cruise Control Systems - Repair Instructions - Cooper

2007 ACCESSORIES AND EQUIPMENT

Cruise Control Systems - Repair Instructions - Cooper

12 RADIO-CONTROLLED LOCKING

66 12 100 REMOVING AND INSTALLING/REPLACING SLIDE-IN UNIT FOR RADIO CONTROL KEY

Special tools required:

• 00 9 340

Necessary preliminary tasks:

• Remove knee protection, driver's side, right

Lever out trim (1) with special tool 00 9 340 at retaining points (2) in direction of arrow.

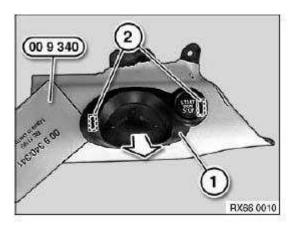


Fig. 1: Special Tool (00 9 340)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove slide-in unit for radio control key (2).

2007 ACCESSORIES AND EQUIPMENT Cruise Control Systems - Repair Instructions - Cooper

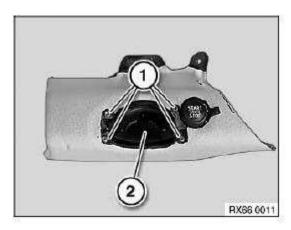
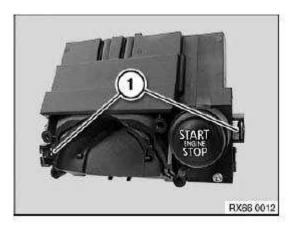


Fig. 2: Screws And Radio Control Key
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure clasps (1) are correctly seated, replace if necessary.



<u>Fig. 3: Clasps</u> Courtesy of BMW OF NORTH AMERICA, INC.

20 PARK DISTANCE CONTROL

66 20 ... REPLACING REAR ULTRASONIC TRANSDUCER

NOTE: The ultrasonic transducer can be replaced without removing the bumper trim.

To remove ultrasonic transducer (1), it is necessary to partially detach the rear underbody panelling.

2007 ACCESSORIES AND EQUIPMENT Cruise Control Systems - Repair Instructions - Cooper



<u>Fig. 4: Ultrasonic Transducer</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect associated plug connection.

Expand catches (1) and remove ultrasonic transducer (2) in direction of arrow.

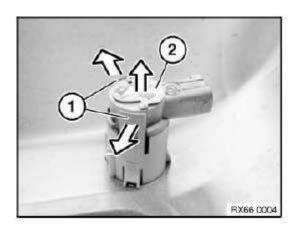


Fig. 5: Catches And Ultrasonic Transducer Courtesy of BMW OF NORTH AMERICA, INC.

66 20 508 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT (PARK DISTANCE CONTROL)

Necessary preliminary tasks:

• Remove right rear light

Disconnect plug connection (1).

Release nuts (2) and remove control unit (3).

2007 ACCESSORIES AND EQUIPMENT Cruise Control Systems - Repair Instructions - Cooper

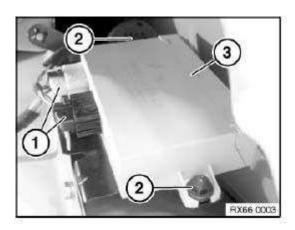


Fig. 6: Nuts And Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out programming/coding.

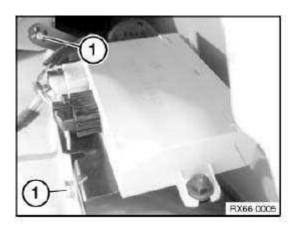
66 20 560 REMOVING AND INSTALLING / REPLACING SIGNAL SENSOR

Necessary preliminary tasks:

• Remove right rear light

Release screws (1) and place bracket with

Park Distance Control unit to one side.



<u>Fig. 7: Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release nut (2) and remove signal sensor (3).

2007 ACCESSORIES AND EQUIPMENT Cruise Control Systems - Repair Instructions - Cooper

Installation:

When installing, make sure that fitting lug of signal sensor (3) is situated in mounting.

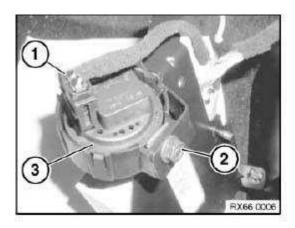


Fig. 8: Nut And Signal Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

2002-07 GENERAL INFORMATION DISplus - Overview - MINI

2002-07 GENERAL INFORMATION

DISplus - Overview - MINI

DISPLUS

DISPLUS

Purpose of the System

The purpose of the DISplus is to meet the challenges for present and future generation BMW group vehicles.

The functions of the DISplus that are:

- Diagnosis Program
- Measurement Techniques
- Remote Controller for the SSS to perform Coding Individualization and Programming

The DISplus has Network capability and allows for any necessary upgrades in the future to keep up with the vehicle technology to come.



Fig. 1: DISplus Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Specifications:

• 500Mhz Intel PentiumTM III processor

2002-07 GENERAL INFORMATION DISplus - Overview - MINI

- 128MB RAM
- 13.6 GB hard drive
- DVD drive
- Sound card with 2 speakers
- Network card for LAN connection (connected to the Service Department network)
- Additional SVGA output for connection to an external monitor
- 15" TFT touch screen monitor
- Vehicle communication via a diagnostic head (Radio frequency)

System Components

Monitor

The DISplus uses a 15" TFT (Thin Film Transistor) monitor. It has a pressure sensitive touch screen controller to direct the curser movement.

The monitor is attached to the DISplus by a 15" cable that allows it to be used either on the swivel stand or remotely, e.g. inside of a vehicle.



Fig. 2: DISplus Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

Main Power Switch

The main power switch is located in the upper right hand side, at the rear of the DISplus.

The main switch is turned on first, before turning the DISplus on from the front panel. The System Status LED on the front panel should illuminate amber when the main power has been turned on.

Circuit breakers are located below the DISplus computer. If the unit fails to power-up, check the reset of the circuit breakers before calling for service.

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ON/OFF Switch

Rear Panel

Fig. 3: ON/OFF Switch Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

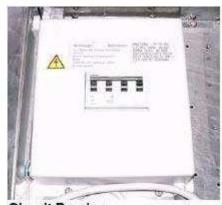


UN/OFF Button & Statue

Front panel

<u>Fig. 4: ON/OFF Button And Statue Leds Front Panel</u> Courtesy of BMW OF NORTH AMERICA, INC.

2002-07 GENERAL INFORMATION DISplus - Overview - MINI



Circuit Breaker

Under CPU (base)

Fig. 5: Circuit Breaker Under CPU (Base)
Courtesy of BMW OF NORTH AMERICA, INC.

System Indicators and ON/OFF Button

After the main power switch has been turned on, the DISplus is powered up by pressing the on/off button on the front panel.

During power up, LED 2 will illuminate. When the process is complete, the System Status LED changes from amber to green.

The fault indicator, LED 3, illuminates amber when there is a fault with the DISplus.



Fig. 6: System Indicators And ON/OFF Button Courtesy of BMW OF NORTH AMERICA, INC.

DVD and 3.5" Floppy Drive

The DVD and Floppy drives are located behind a door on the right side of the unit.

The Floppy drive is used for the boot-up disk when loading the Diagnosis Program.

2002-07 GENERAL INFORMATION DISplus - Overview - MINI

The DVD drive is used to load the Basis and Program CDs for Diagnosis.

The TIS CD is also loaded in the DVD drive and remains in the drive for the computer to access during TIS operation.



Fig. 7: DVD And 3.5" Floppy Drive Courtesy of BMW OF NORTH AMERICA, INC.

RF Access Point

The access point is the transfer device between the hardwired LAN network and the radio frequency assisted LAN.

The DISplus is connected to the access point via a network LAN cable. The access point then communicates with the Diagnostic Head using a radio frequency LAN link.



Fig. 8: RF Access Point Courtesy of BMW OF NORTH AMERICA, INC.

Diagnostic Head

The DISplus uses a Diagnostic Head similar to the DISplus III as the communication link between the DISplus

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and the vehicle electronics.

The Head receives operating power when the diagnosis cable is connected to the vehicle.



Fig. 9: DISplus Diagnostic Head Courtesy of BMW OF NORTH AMERICA, INC.

Communication between the DISplus and the Head can occur two ways:

- Radio frequency (maximum 30m distance)
- Hard wired to the network or DISplus

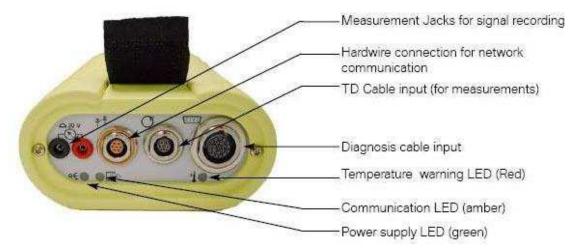


Fig. 10: Communication Between DISPlus And Head Courtesy of BMW OF NORTH AMERICA, INC.

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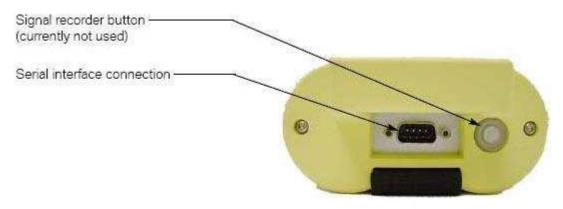
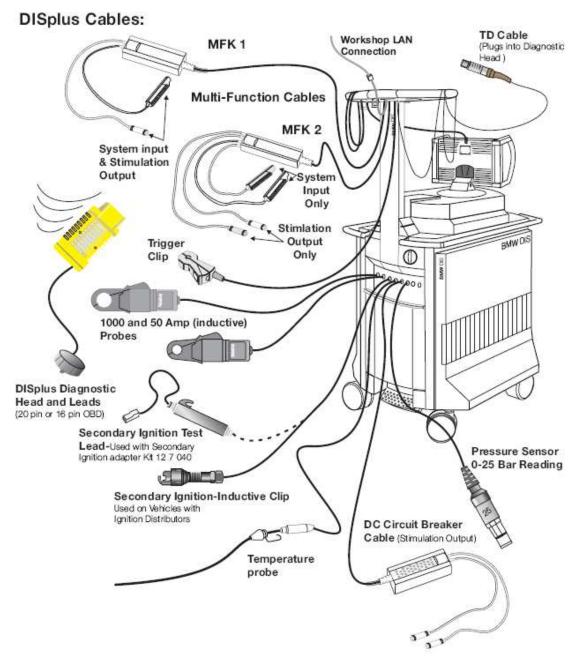


Fig. 11: Signal Recorder Button And Serial Interface Connection Courtesy of BMW OF NORTH AMERICA, INC.

DISplus Cables and Leads



<u>Fig. 12: DISplus Cables And Leads</u> Courtesy of BMW OF NORTH AMERICA, INC.

Diagnostic Cable

20 and 16 pin cables are provided for connection between the vehicle diagnostic socket and Diagnostic Head.

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16 pin OBD II connector

Fig. 13: 16 Pin OBDII Connector Courtesy of BMW OF NORTH AMERICA, INC.



20 pin connector (not used for MINI)

Fig. 14: 20 Pin Connector (Not Used For MINI) Courtesy of BMW OF NORTH AMERICA, INC.

Test Cables

Various test cables and the main power cable are connected to the rear of the DISplus through the conduit channel of the cable arm mast. The following test cables are stored on the arm.

LAN (Local Area Network) Connection

The LAN connection has the appearance of a large phone receptacle. It provides the connection for the DISplus to the Ethernet wiring for the Service Department Network.

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<u>Fig. 15: Test Cables</u> Courtesy of BMW OF NORTH AMERICA, INC.

TD (RPM input) Cable

TD is a processed engine RPM signal. The TD input cable is used for specific test modules or preset measurements that require a hard wired RPM input for measurement functions.



Fig. 16: TD (RPM Input) Cable Courtesy of BMW OF NORTH AMERICA, INC.

Multi-Function Test Cable-MFK#1 (two cable ends)

MFK 1 is used to measure:

- Voltage up to 50 Volts
- Current up to 2 Amps

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- Resistance
- Diode Testing
- Frequency
- Period
- Duty Cycle
- Pulse Duration
- Oscilloscope Measurements



Fig. 17: Multi-Function Test Cable-Mfk#1 (Two Cable Ends) Courtesy of BMW OF NORTH AMERICA, INC.

Multi-Function Test Cable-MFK #2 (Four cable ends)

MFK 2 is used to measure:

- Voltage up to 500 Volts
- Frequency
- Period
- Duty Cycle
- Pulse Duration
- Oscilloscope Measurements

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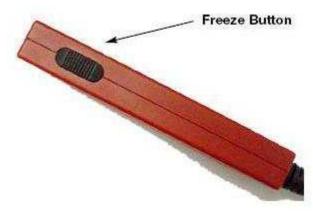


Fig. 18: Multi-Function Test Cable-Mfk #2 (Four Cable Ends) Courtesy of BMW OF NORTH AMERICA, INC.

Both MFK 1 and MFK 2 can be used for signal outputs from the stimulate output function of the multimeter.

On MFK 2, the two large cable ends are for input only (measuring) and the two small ends are for the Stimulate Output function. MFK 1 's leads are for both measuring and stimulation.

Both large positive cable ends of MFK 1 and MFK 2 include a button used to hold the measured value on the display screen.



<u>Fig. 19: Freeze Button</u> Courtesy of BMW OF NORTH AMERICA, INC.

Trigger Clip (inductive)

The trigger clip is used when testing ignition or fuel injection systems to establish engine firing order.

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Fig. 20: Trigger Clip (Inductive)
Courtesy of BMW OF NORTH AMERICA, INC.

Additional Test Cables

There are additional test cables connected to the rear of the DISplus on the measurement system board. The ends of the cables are color-coded for easy identification.

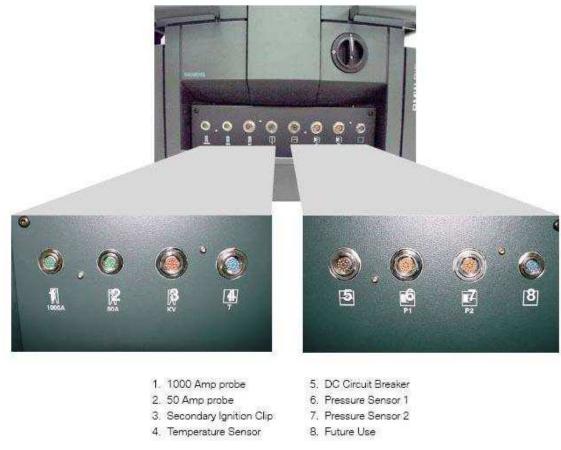


Fig. 21: Rear Displus Measurement System Board Courtesy of BMW OF NORTH AMERICA, INC.

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Secondary Ignition Test Cables

The inductive clip (1) is used when checking secondary ignition on MINI vehicles. It is clipped to the vehicle's spark plug wire.



<u>Fig. 22: Secondary Ignition Test Cables</u> Courtesy of BMW OF NORTH AMERICA, INC.

50 and 1000 Amp Inductive Probes

The Amp probes measure AC and DC current. They are self calibrating inductive pickups.



<u>Fig. 23: 50 And 1000 Amp Inductive Probes</u> Courtesy of BMW OF NORTH AMERICA, INC.

Temperature Sensor

The long temperature probe measures the temperature of liquids and gasses. The measurement range is from - 20°C to 200°C.

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Fig. 24: Temperature Sensor Probe Courtesy of BMW OF NORTH AMERICA, INC.

Pressure Sensor

The Pressure Sensor measures from 0 to 25 bar. There are two pressure inputs to the measuring unit that permit two different pressures to be measured simultaneously if two sensors are used.



Fig. 25: Pressure Sensor Courtesy of BMW OF NORTH AMERICA, INC.

Notes:

2002-08 ENGINE COOLING Specifications & Drive Belt Routing - Cooper (W10) & Cooper S (W11)

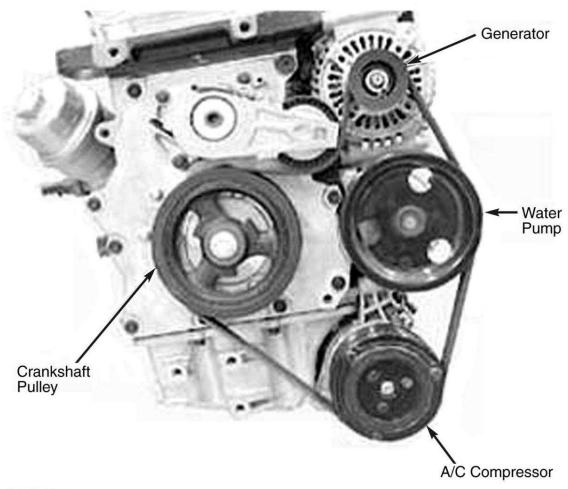
2002-08 ENGINE COOLING

Specifications & Drive Belt Routing - Cooper (W10) & Cooper S (W11)

BELT ADJUSTMENT

Mini Cooper belt tensioner uses a torsional spring to apply load to belt and a friction damper to reduce the pulsations from engine. Mini Cooper S belt tensioner uses a compression spring to apply load to belt and a hydraulic damper to control engine pulsation.

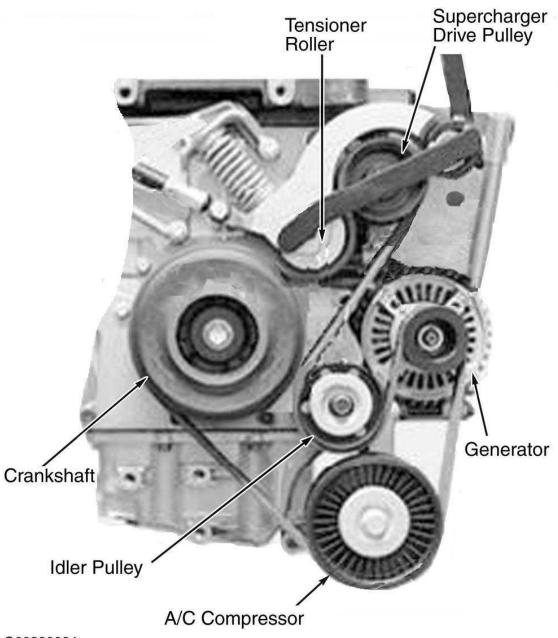
DRIVE BELT ROUTING



G00280085

Fig. 1: Drive Belt Routing (Cooper; W10 Engine) Courtesy of BMW OF NORTH AMERICA, INC.

2002-08 ENGINE COOLING Specifications & Drive Belt Routing - Cooper (W10) & Cooper S (W11)



G00280084

Fig. 2: Drive Belt Routing (Cooper S; W11 Engine) Courtesy of BMW OF NORTH AMERICA, INC.

SPECIFICATIONS

COOLANT CAPACITY

Application	Quantity
Cooling System	
Mini Cooper	5.6 Qts. (5.3L)

2002-08 ENGINE COOLING Specifications & Drive Belt Routing - Cooper (W10) & Cooper S (W11)

Mini Cooper S 6.3 Qts. (6.0L)

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Cooper

BUZZERS, RELAYS & TIMERS

BUZZERS, RELAYS & TIMERS LOCATION

Component	Location
DME Relay (K6300)	In front power distribution box. See Fig. 5 .
Electric Fan Relay (K21)	In front power distribution box. See Fig. 3.
Electric Fan Relay 2 (K22)	In front power distribution box. See Fig. 3 .
Engine Breather Heating Relay (K6539)	In front power distribution box. See Fig. 5 .
Headlight Washer Module (K6)	In junction box. See Fig. 2 .
Rear Window Defogger Relay (K13)	In junction box. See Fig. 1 .
Rear Wiper Relay (K91)	In junction box. See Fig. 2 .
Relay, A/C Compressor (K19)	In junction box. See Fig. 2 .
Relay, Front Washer Pump (K5)	In junction box. See Fig. 2 .
Secondary Air Pump Relay (K6304a)	Left rear of engine compartment. See Fig. 6.
Terminal 15 Power-Saving Relay (K6326)	In front power distribution box. See Fig. 3.
Terminal 15 Relay (I01069)	In junction box. See Fig. 1 .
Terminal 30G Relay (I01068)	In junction box. See Fig. 2 .
Valvetronic Relay (K6319a)	Left rear of engine compartment. See Fig. 6.
Windshield Heater Relay (K416)	Left side of left footwell. See Fig. 109.
Wiper Relay 1 (K36)	In front power distribution box. See Fig. 4.
Wiper Relay 2 (K37)	In front power distribution box. See Fig. 4.

CIRCUIT PROTECTION DEVICES

CIRCUIT PROTECTION DEVICES LOCATION

Component	Location
Front Power Distribution Box (A400a)	Left side of engine compartment. See Fig. 4.
Fuse Box (A406)	Right rear of engine compartment. See Fig. 19.
Junction Box (A4010)	Right side of right footwell. See Fig. 2.

CONTROL UNITS

CONTROL UNITS LOCATION

Component	Location
Accelerator Pedal Module (B10)	Part of acceleration pedal assembly. See <u>Fig. 27</u> .
Car Access System (A149a)	Left top side of dash. See Fig. 15.
Comfort Access Control Module (A215)	Behind right rear trim panel. See Fig. 18.
Footwell Module (A4011)	Left side of left footwell. See Fig. 21 .

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Fuel Tank Leakage Diagnostic Module (M119a)	Front of right rear wheel. See Fig. 69 .
Interior Movement Detector (A121b)	In overhead console. See Fig. 13.
Multiple Restraint System Control Unit (A12)	Center console. See Fig. 9 .
Outside Mirror Fold-In (A208)	Behind left rear trim panel. See Fig. 10.
Park Distance Control Unit (PDC) (A81)	Right side of rear compartment. See Fig. 12.
Sunroof Module Control Unit (A33)	Under center front headliner. See Fig. 11.

MOTORS

MOTORS LOCATION

Component	Location
Air Distribution Flap Motor (M150)	Behind center of dash. See Fig. 38.
Blower Motor (M30)	Behind center of dash. See Fig. 28.
Central Locking Drive, Fuel Filler Flap (M16)	Left side of rear compartment. See Fig. 63.
Central Locking Drive, Trunk Lid (M17a)	Center rear of trunk. See Fig. 64.
Driver's Door System Lock (S47)	Rear of driver's door. See Fig. 79.
Driver's Window Motor (M21)	Front of driver's door. See Fig. 65 .
Electric Steering Column Adjustment (M137a)	Under left side of dash. See Fig. 70.
Fresh Air/ Recirculation Flap Motor (M111)	Behind center of dash. See Fig. 38.
Friction Wheel Drive (M2327)	Front center of engine. See Fig. 73.
Headlight Washer Pump (M7)	Left front wheelwell. See Fig. 62 .
Mixer Flap Motor (M152)	Behind center of dash. See Fig. 71.
Passenger's Door System Lock (S49)	Rear of passenger's door. See Fig. 80.
Passenger's Window Motor (M23)	Front of passenger's door. See Fig. 66.
Rear Window Wiper Motor (Except Clubman) (M94a)	Center rear of lift gate. See Fig. 68.
Rear Window Wiper Motor Left Rear (M94a) (Clubman)	Center rear of lift gate. See Fig. 114.
Rear Window Wiper Motor Right Rear (M94b) (Clubman)	Center rear of lift gate. See Fig. 115 .
Secondary Air Injection Pump (M63)	Right front of engine compartment. See <u>Fig.</u> <u>67</u> .
Starter (M6510a) (Except Supercharged)	Bottom rear of engine compartment. See <u>Fig.</u> <u>74</u> .
Turbocharger Coolant Pump (M220)	Left rear of engine. See Fig. 72.
Valvetronic Actuator Motor (M6351)	Right rear of engine. See Fig. 55.
Windshield Washer Pump (M4)	Front of left front wheel. See Fig. 62.
Wiper Motor (M3a)	Left rear of engine compartment. See Fig. 32.

SENDING UNITS & SENSORS

SENDING UNITS & SENSORS LOCATION

Component	Location

Automatic Air Recirculation Sensor (B414)	Fig. 32.
Camshaft Sensor - Exhaust (B6224a) (Except Supercharged)	Top right rear side of engine. See Fig. 51 .
Camshaft Sensor - Intake (B6214a) (Except Supercharged)	Top right rear side of engine. See Fig. 50 .
Camshaft Sensor - Intake (B6214a) (Supercharged)	Top rear center of engine. See Fig. 49 .
Characteristic Map Thermostat (B6279) (Except Supercharged)	Right rear side of engine. See <u>Fig. 55</u> .
Characteristic Map Thermostat (B6279) (Supercharged)	Top rear center of engine. See <u>Fig. 56</u> .
Crankshaft Sensor (B6203a)	Right rear of engine. See Fig. 48 .
Driver's Side "B" Pillar Airbag Sensor (A173a)	Behind left rear trim panel. See Fig. 16.
Driver's Side Door Airbag Sensor (B78)	Front of driver's door. See Fig. 39.
Driver's Side Front Airbag Sensor (B10508)	Front of left front wheel. See Fig. 34.
DSC Senor (B61035)	Right Passenger Floor. See Fig. 112.
Eccentric Shaft Sensor (B60213)	Top right rear side of engine. See Fig. 50 .
Engine Coolant Temperature Sensor (B6232) (Except	Top right rear side of engine. See Fig. 51 .
Supercharged) Engine Coolant Temperature Sensor (B6232) (Supercharged)	Top right rear side of engine. See Fig. 52 .
	Behind center of dash. See <u>Fig. 32</u> .
Evaporator Temperature Sensor (B14a)	Behind center of dash. See Fig. 28.
Heat Exchanger Sensor (B11b)	
Hot Film-Air Mass Meter (B6207a)	Top rear center of engine. See <u>Fig. 49</u> .
Intake Pipe Pressure Sensor (B6239)	Right front side of engine. See Fig. 53.
Intake Temperature-Boost Pressure Sensor (B6123)	Top front center of engine. See Fig. 47.
Intake Temperature-Differential Pressure Sensor (B6286)	Right rear side of engine. See Fig. 55.
Knock Sensor (B6241) (Except Supercharged)	Right side of engine. See Fig. 45.
Knock Sensor (B6241) (Supercharged)	Right side of engine. See Fig. 44.
Left Front Brake Pad Wear Sensor (B16a)	Front of left front wheel. See Fig. 30.
Left Rear Center Ultrasonic Sensor (Clubman) (B35a)	Rear bumper. See <u>Fig. 111</u> .
Left Rear Center Ultrasonic Sensor (Except Clubman) (B35a)	Rear bumper. See <u>Fig. 33</u> .
Left Rear Ultrasonic Sensor (Clubman) (B34a)	Rear bumper. See <u>Fig. 111</u> .
Left Rear Ultrasonic Sensor (Except Clubman) (B34a)	Rear bumper. See <u>Fig. 33</u> .
Neutral Sensor (B456)	Left rear of engine. See <u>Fig. 42</u> .
Oxygen Sensor (B62101) (Except Supercharged)	Top of exhaust pipe. See <u>Fig. 42</u> .
Oxygen Sensor (B62101) (Supercharged)	Top of exhaust pipe. See Fig. 43 .
Oxygen Sensor (B62102) (Except Supercharged)	Bottom of exhaust pipe. See Fig. 42.
Oxygen Sensor (B62102) (Supercharged)	Bottom of exhaust pipe. See Fig. 43.
Passenger's Side "B" Pillar Airbag Sensor (Clubman) (A174a)	Behind right rear trim panel. See <u>Fig.</u> 110.
Passenger's Side "B" Pillar Airbag Sensor (Except Clubman) (A174a)	Behind right rear trim panel. See <u>Fig. 17</u> .
Passenger's Side Door Airbag Sensor (B79)	Front of passenger's door. See Fig. 40.
Passenger's Side Front Airbag Sensor (B10509)	Front of right front wheel. See Fig. 57 .
Rail Pressure Sensor (B2261)	Right side of engine. See Fig. 44 .
Dain/Handlight Congar (D57h)	Windshield ton See Fig. 37

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Rear Ride Height Sensor (B64a)	Behind left rear wheel. See Fig. 26.
Right Rear Brake Pad Wear Sensor (B17a)	Behind right rear wheel. See Fig. 31.
Right Rear Center Ultrasonic Sensor (B36a)	Rear bumper. See Fig. 33.
Right Rear Center Ultrasonic Sensor (Clubman) (B36a)	Rear bumper. See Fig. 111.
Right Rear Ultrasonic Sensor (B37a)	Rear bumper. See Fig. 33.
Right Rear Ultrasonic Sensor (Clubman) (B37a)	Rear bumper. See Fig. 111.
Solar Sensor (B66)	Behind center of dash. See Fig. 38.
Speed Sensor Left Front (B2)	Left front wheel hub. See Fig. 24.
Speed Sensor Left Rear (B4)	Left rear wheel hub. See Fig. 26.
Speed Sensor Right Front (B1)	Right front wheel hub. See Fig. 23.
Speed Sensor Right Rear (B3)	Right rear wheel hub. See Fig. 25.

SOLENOIDS & SOLENOID VALVES

SOLENOIDS & SOLENOID VALVES LOCATION

Component	Location
Electric Throttle Valve Actuator (Y63900) (Except Supercharged)	Right front of engine. See <u>Fig. 54</u> .
Electric Throttle Valve Actuator (Y63900) (Supercharged)	Right front of engine. See Fig. 53.
Evaporative Emission Valve (Y6120) (Except Supercharged)	Right side of engine. See Fig. 45 .
Evaporative Emission Valve (Y6120) (Supercharged)	Right side of engine. See Fig. 46 .
Fuel Injection 1 (Y6101) (Except Supercharged)	Top right side of engine. See Fig. 89 .
Fuel Injection 1 (Y6101) (Supercharged)	Top right side of engine. See Fig. 90 .
Fuel Injection 2 (Y6102) (Except Supercharged)	Top right side of engine. See Fig. 89 .
Fuel Injection 2 (Y6102) (Supercharged)	Top right side of engine. See Fig. 90 .
Fuel Injection 3 (Y6103) (Except Supercharged)	Top right side of engine. See Fig. 89 .
Fuel Injection 3 (Y6103) (Supercharged)	Top right side of engine. See Fig. 90 .
Fuel Injection 4 (Y6104) (Except Supercharged)	Top right side of engine. See Fig. 89 .
Fuel Injection 4 (Y6104) (Supercharged)	Top right side of engine. See <u>Fig. 90</u> .
Thrust Air Control Valve (Y6040)	Top left rear side of engine. See Fig. 88 .
VANOS Solenoid Valve - Exhaust (Y6276) (Except Supercharged)	Top right front side of engine. See <u>Fig.</u> <u>91</u> .
VANOS Solenoid Valve - Intake (Y6275) (Except Supercharged)	Right front side of engine. See Fig. 54 .
VANOS Solenoid Valve - Intake (Y6275) (Supercharged)	Right front side of engine. See <u>Fig. 53</u> .
Volume Control Valve (Y2381)	Top rear center of engine. See Fig. 56 .
Wastegate Valve (Y6039)	Right side of engine. See Fig. 46 .

SWITCHES

SWITCHES LOCATION

omnonent

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Air Distribution Microswitch (Y715)	Behind center of dash. See Fig. 71.
Brake Fluid Level Switch (B18a)	Left rear side of engine compartment. See Fig. 32.
Brake Light Switch (S29)	Left side of left footwell. See Fig. 78.
Clutch Module (S805a)	Under left side of dash. See Fig. 81.
Hood Contact Switch (S19a)	Left rear side of engine compartment. See Fig. 77.
Oil Pressure Switch (B6231) (Except Supercharged)	Top left rear side of engine. See Fig. 51.
Oil Pressure Switch (B6231) (Supercharged)	Top rear center of engine. See Fig. 52.
Parking Brake Warning Switch (S31a)	Center console. See Fig. 9 .
Washer Fluid Level Switch (S136a)	Front of left front wheel. See Fig. 34.

MISCELLANEOUS

MISCELLANEOUS LOCATION

Component	Location
AF Interference Suppressor Filter (U410)	Left rear corner of roof. See Fig. 85 .
Airbag Inflator Assembly, Driver's Side Head (G17)	Under left center side headliner. See <u>Fig. 59</u> .
Airbag Inflator Assembly, Passenger's Side Head (G18)	Under right center side headliner. See <u>Fig.</u> <u>59</u> .
Amplifier (A18)	Behind left rear trim panel. See Fig. 10 .
Antenna Diversity (A421)	Right side of rear compartment door. See Fig. 20.
Battery (G1)	Right rear of engine compartment. See <u>Fig.</u> <u>19</u> .
Blower Output Stage (N2)	Behind center of dash. See Fig. 29.
Bluetooth Antenna (W18)	Center console. See Fig. 14.
Digital Tuner (N48)	Right side of rear compartment. See <u>Fig. 76</u> .
Electric Auxiliary Heater (R6138)	Behind center of dash. See Fig. 29.
Engine Breather Heater 1 (Except Supercharged) (E65391)	Right rear side of engine. See <u>Fig. 46</u> .
Engine Breather Heater 1 (Supercharged) (E65391)	Right rear side of engine. See Fig. 113.
Front Center Console Interior Antenna (W10b)	Center console. See <u>Fig. 86</u> .
Horn (H2b)	Front of right front wheel. See Fig. 61 .
Horn 2 (H3b)	Front of right front wheel. See <u>Fig. 57</u> .
Ignition Coil 1 (T6151) (Except Supercharged)	Top left side of engine. See <u>Fig. 82</u> .
Ignition Coil 1 (T6151) (Supercharged)	Top of engine. See Fig. 83 .
Ignition Coil 2 (T6152) (Except Supercharged)	Top left side of engine. See Fig. 82 .
Ignition Coil 2 (T6152) (Supercharged)	Top of engine. See Fig. 83 .
Ignition Coil 3 (T6153) (Except Supercharged)	Top left side of engine. See Fig. 82 .
Ignition Coil 3 (T6153) (Supercharged)	Top of engine. See <u>Fig. 83</u> .
Ignition Coil 4 (T6154) (Except Supercharged)	Top left side of engine. See <u>Fig. 82</u> .
Ignition Coil 4 (T6154) (Supercharged)	Top of engine. See Fig. 83 .
Inflator Assembly Passenger Airbag (G6)	Top right side of dash See Fig. 58

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Interference Suppression Capacitor (I01046) (Except Supercharged)	Top right side of engine. See Fig. 7 .
Interference Suppression Capacitor (I01046) (Supercharged)	Top right side of engine. See Fig. 8 .
Left Exterior Antenna (W11a)	Behind left rear trim panel. See Fig. 87.
Left Front RDS Transmitter (B43a)	Front of left front wheel. See Fig. 34.
Left Microphone (B402)	In overhead console. See Fig. 41.
Left Rear RDC Transmitter (B45a)	Behind left rear wheel. See Fig. 26.
Left Rear Seat Belt Tensioner (G27)	Center of rear seat. See Fig. 60 .
RDC Antenna (B46a)	Behind right rear wheel. See Fig. 35.
Rear Window Defroster (Ground) Lockout Circuit (Z2)	Left side of rear compartment door. See <u>Fig. 92</u> .
Rear Window Defroster (Positive) Lockout Circuit (Z1)	Right side of rear compartment door. See Fig. 92.
Right Exterior Antenna (W12)	Center of rear seat. See Fig. 60.
Right Exterior Antenna (W12a)	Behind right rear trim panel. See Fig. 18.
Right Front RDC Transmitter (B47a)	Front of right front wheel. See Fig. 36 .
Right Microphone (B403)	In overhead console. See Fig. 41.
Right Rear RDC Transmitter (B44a)	Behind right rear wheel. See Fig. 35.
Right Rear Seat Belt Tensioner (G28)	Center of rear seat. See Fig. 60.
Satellite Receiver (N47)	Under passenger's seat. See Fig. 75.
Telephone Transceiver (U400a)	Under driver's seat. See Fig. 84.

CONNECTORS

CONNECTORS LOCATION

Component	Location
X15 (42 Pin)	Left side of left footwell. See Fig. 78.
X256 (32 Pin)	Right side of dash panel. See Fig. 105.
X257 (32 Pin)	Front of driver's door. See Fig. 106 .
X275	Under driver's seat. See Fig. 107 .
X279 (19 Pin)	Under passenger's seat. See Fig. 108.
X9337 (12 Pin)	Left side of left footwell. See Fig. 78.
X13566 (18 pin)	Front of driver's door. See Fig. 39 .
X13567 (10 Pin)	Front of passenger's door. See Fig. 95.

GROUNDS

GROUNDS LOCATION

Component	Location
X4	Top of left front wheel. See Fig. 102 .
X165	Front of right front wheel. See Fig. 93.
X175	I eft front side of engine compartment. See Fig. 94

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X490	Behind right rear trim panel. See Fig. 18 .
X2042	Left side of left footwell. See Fig. 21.
X2184	Under driver's seat. See Fig. 84 .
X2846	Right side of right footwell, under door. See Fig. 100 .
X13016	Behind left rear trim panel. See Fig. 10 .
X13795	Behind left rear trim panel. See Fig. 10 .
X14147	Rear of engine compartment, near wiper motor. See Fig. 22.
X64561 (Except Supercharged)	Top of engine. See Fig. 104 .
X64561 (Supercharged)	Top of engine. See Fig. 8 .

SPLICES

SPLICES LOCATION

Component	Location
X539	Right side of dash. See Fig. 101.
X1091	Front of passenger's door. See Fig. 95.
X1816	Top rear center of engine. See <u>Fig. 96</u> .
X3279	Right side of dash. See Fig. 101.
X3361	Right side of dash. See Fig. 101.
X3456	Right side of dash. See Fig. 101.
X4136	Rear of passenger's door. See Fig. 103.
X10237	Behind center of dash. See Fig. 97.
X11339	Behind center of dash. See Fig. 98.
X14197	Front of driver's door. See Fig. 99 .

COMPONENT LOCATION GRAPHICS

NOTE: Figures may show multiple component locations. Refer to appropriate table for proper figure references.

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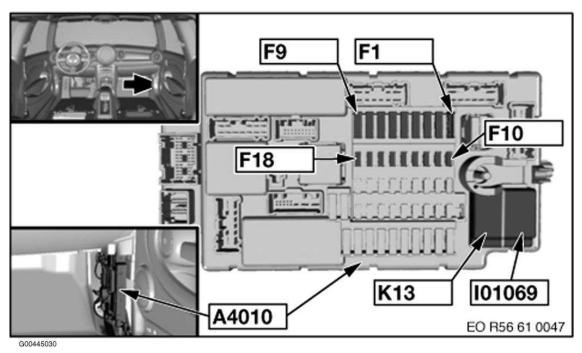


Fig. 1: Right Footwell Courtesy of BMW OF NORTH AMERICA, INC.

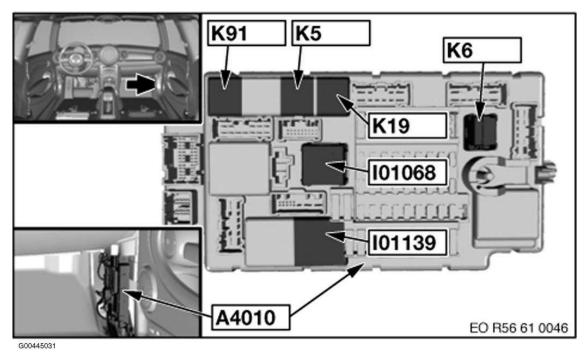


Fig. 2: Right Footwell Courtesy of BMW OF NORTH AMERICA, INC.

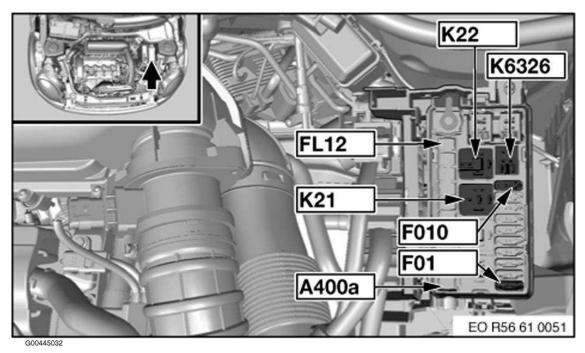
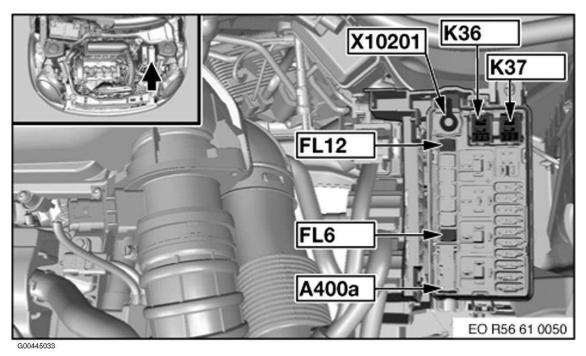


Fig. 3: Left Side Of Engine Compartment Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 4: Left Side Of Engine Compartment</u> Courtesy of BMW OF NORTH AMERICA, INC.

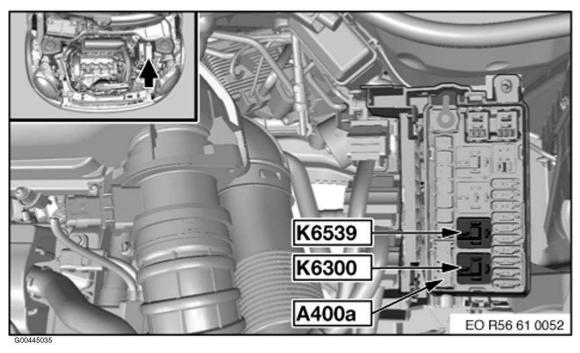
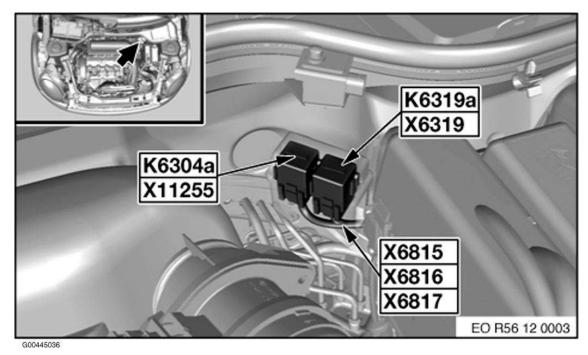


Fig. 5: Left Side Of Engine Compartment Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 6: Left Rear Of Engine Compartment</u> Courtesy of BMW OF NORTH AMERICA, INC.

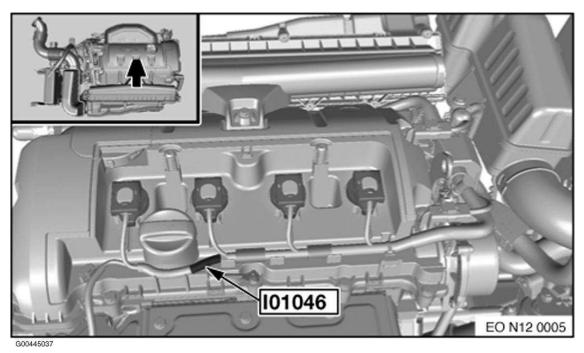
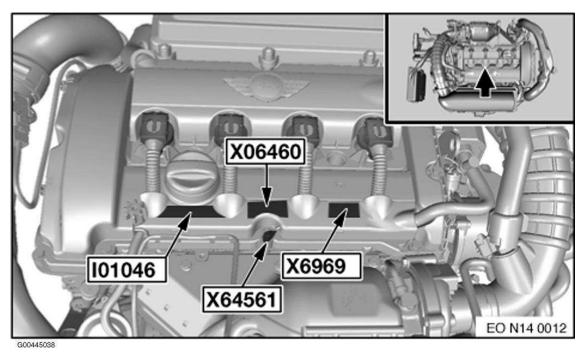


Fig. 7: Top Of Engine (Except Supercharged)
Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 8: Top Of Engine (Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

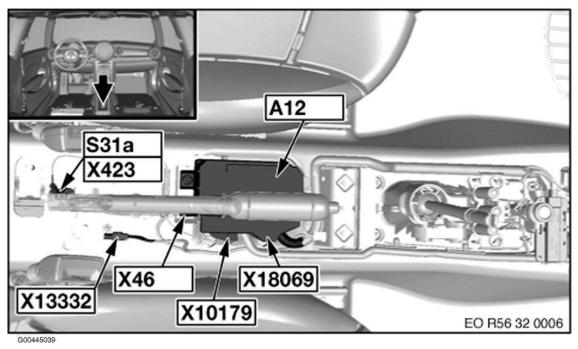


Fig. 9: Center Console Courtesy of BMW OF NORTH AMERICA, INC.

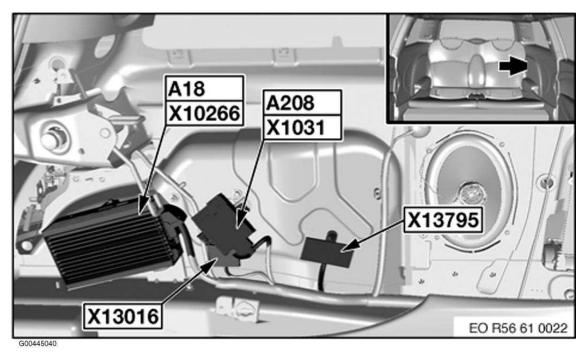


Fig. 10: Left Trim Panel Courtesy of BMW OF NORTH AMERICA, INC.

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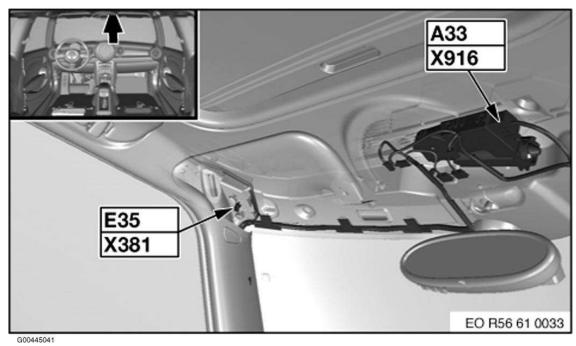
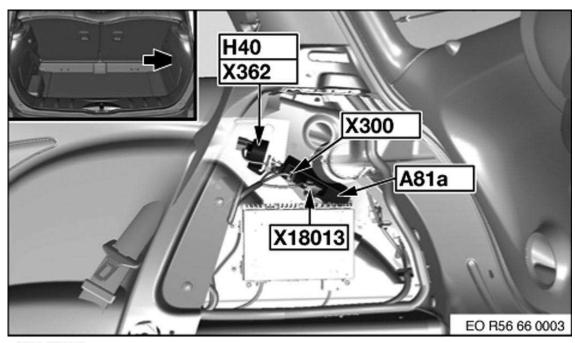


Fig. 11: Center Of Roof

Courtesy of BMW OF NORTH AMERICA, INC.



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<u>Fig. 12: Rear Compartment</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Fig. 13: Center Of Roof Courtesy of BMW OF NORTH AMERICA, INC.

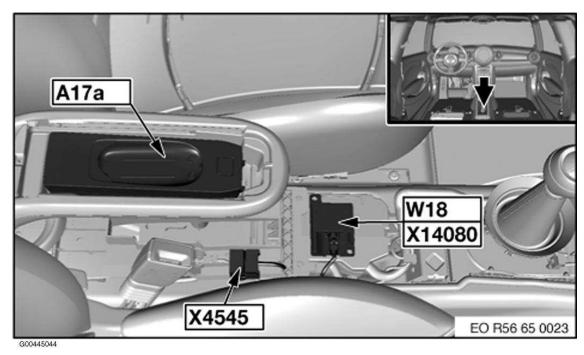


Fig. 14: Center Console Courtesy of BMW OF NORTH AMERICA, INC.

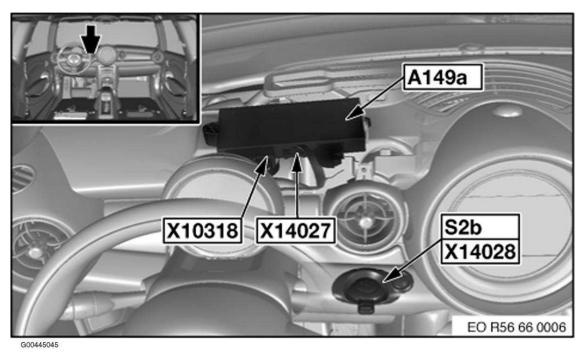


Fig. 15: Left Side Of Dash Courtesy of BMW OF NORTH AMERICA, INC.

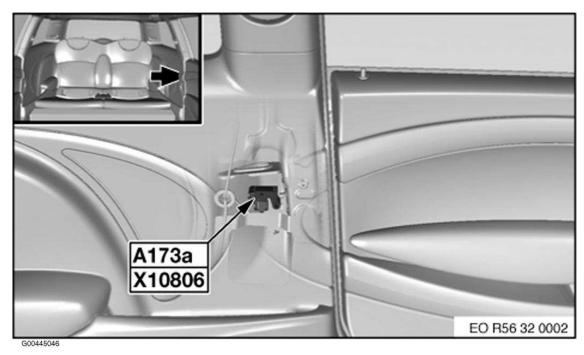


Fig. 16: Left Trim Panel Courtesy of BMW OF NORTH AMERICA, INC.

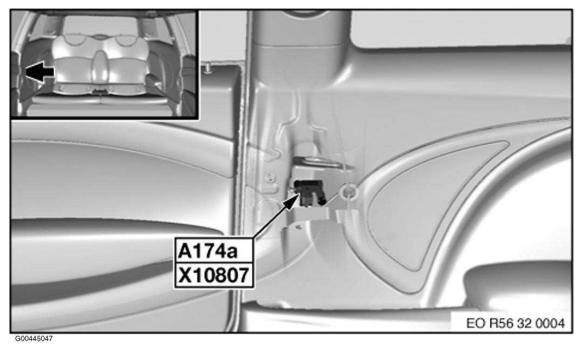


Fig. 17: Right Trim Panel Courtesy of BMW OF NORTH AMERICA, INC.

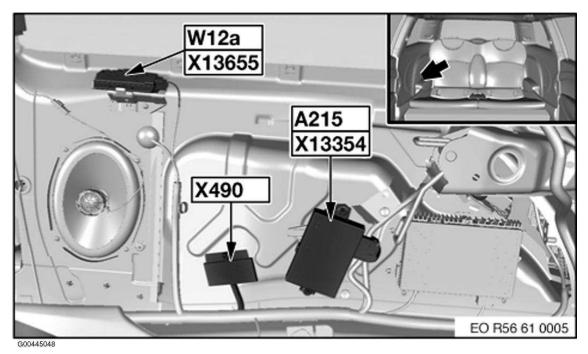


Fig. 18: Right Trim Panel Courtesy of BMW OF NORTH AMERICA, INC.

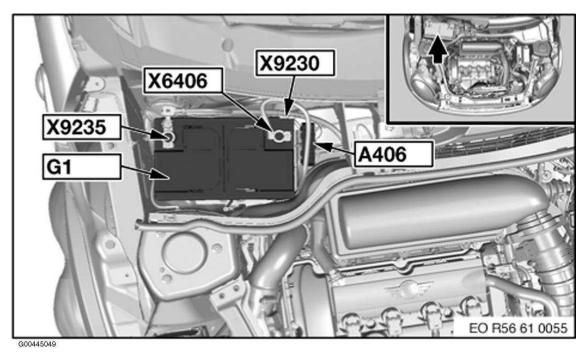
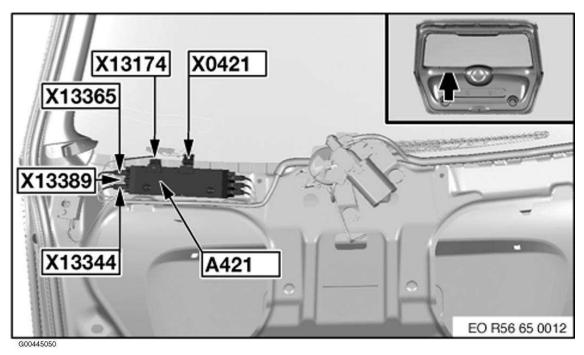


Fig. 19: Right Rear Of Engine Compartment Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 20: Rear Compartment Door</u> Courtesy of BMW OF NORTH AMERICA, INC.

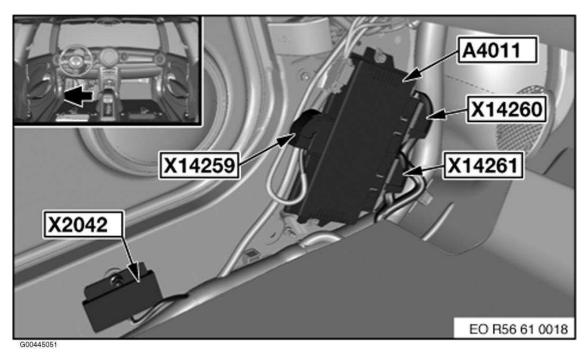
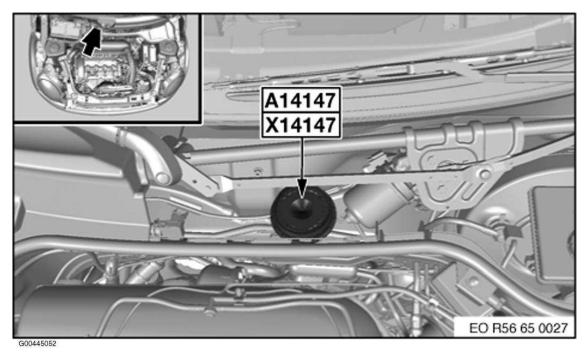


Fig. 21: Left Footwell Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 22: Rear Of Engine Compartment</u> Courtesy of BMW OF NORTH AMERICA, INC.

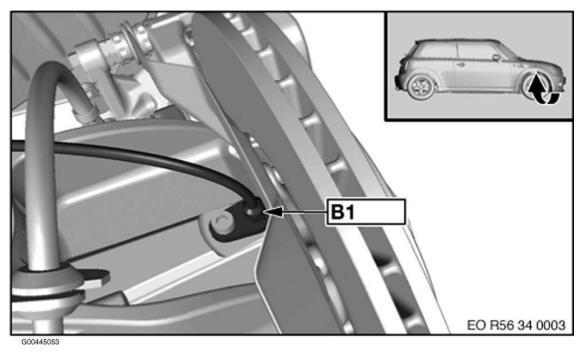


Fig. 23: Right Front Wheel Courtesy of BMW OF NORTH AMERICA, INC.

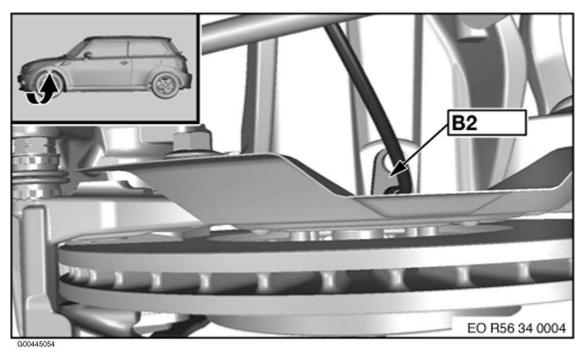


Fig. 24: Left Front Wheel Courtesy of BMW OF NORTH AMERICA, INC.

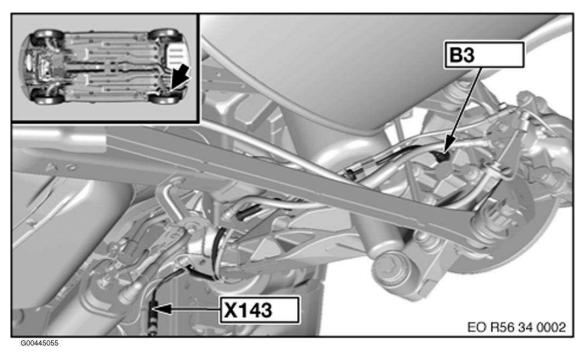


Fig. 25: Right Rear Wheel Courtesy of BMW OF NORTH AMERICA, INC.

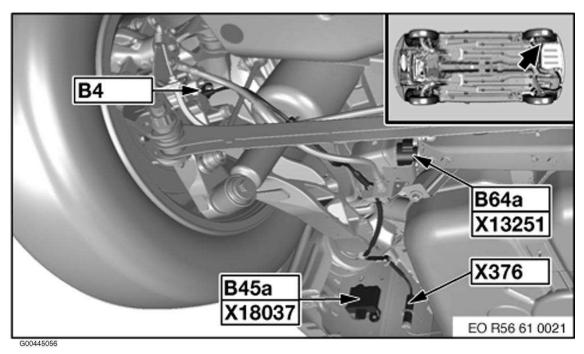
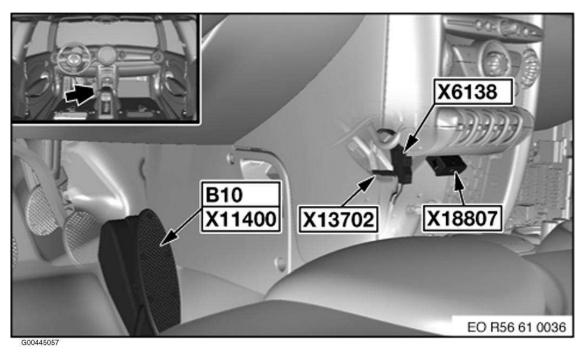
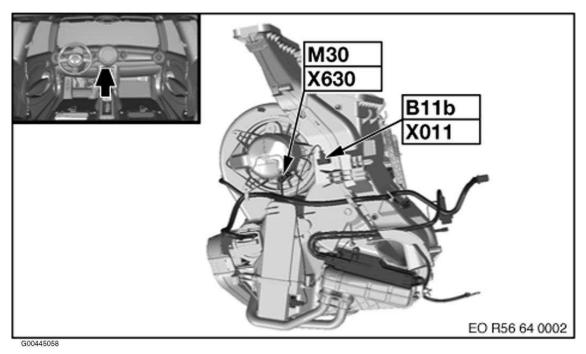


Fig. 26: Left Rear Wheel Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 27: Part Of Acceleration Pedal Assembly</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 28: Center Of Dash</u> Courtesy of BMW OF NORTH AMERICA, INC.

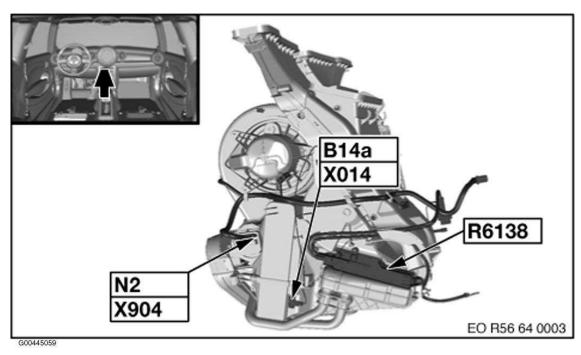


Fig. 29: Center Of Dash Courtesy of BMW OF NORTH AMERICA, INC.

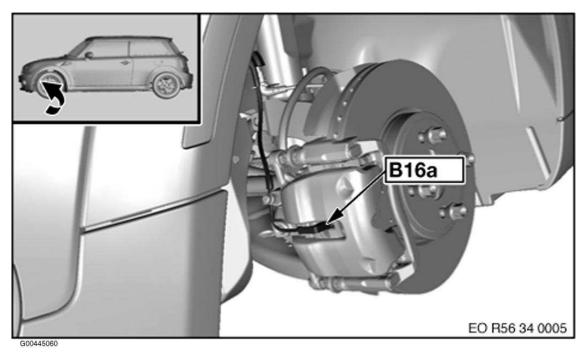


Fig. 30: Left Front Wheel Courtesy of BMW OF NORTH AMERICA, INC.

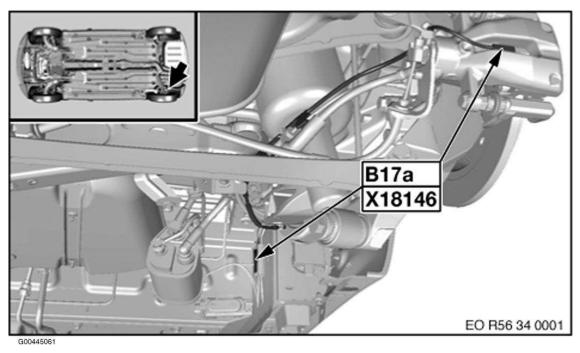
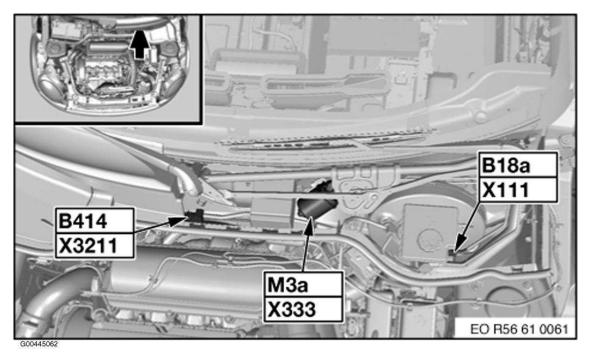
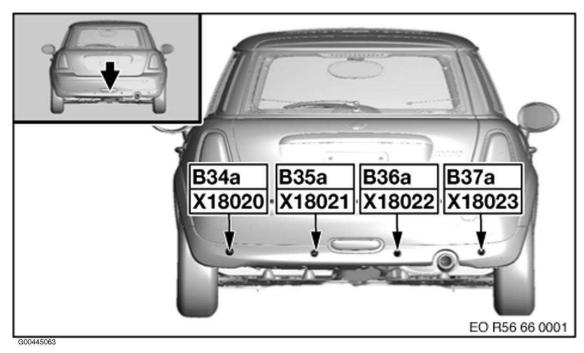


Fig. 31: Right Rear Wheel Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 32: Left Rear Of Engine Compartment</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 33: Rear Bumper</u> Courtesy of BMW OF NORTH AMERICA, INC.

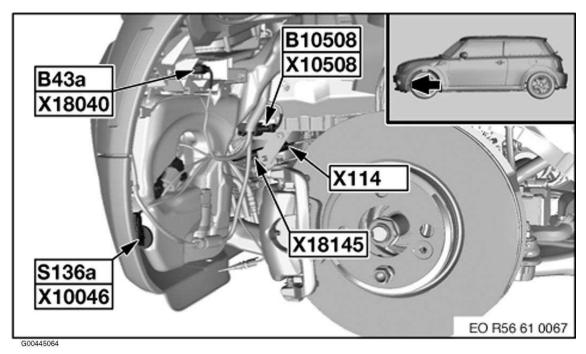


Fig. 34: Left Front Wheel Courtesy of BMW OF NORTH AMERICA, INC.

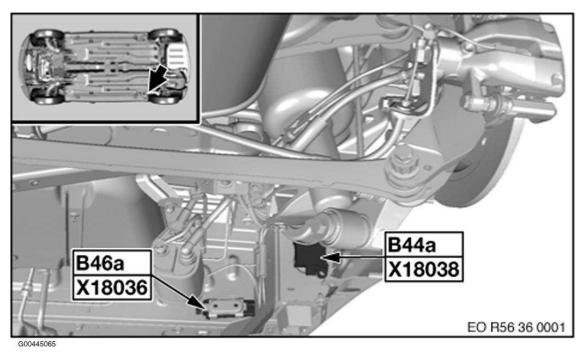


Fig. 35: Right Rear Wheel Courtesy of BMW OF NORTH AMERICA, INC.

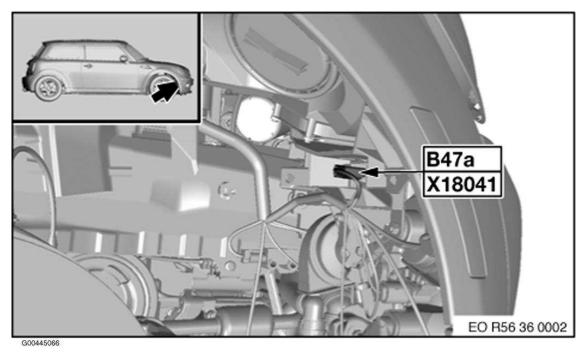


Fig. 36: Right Front Wheel Courtesy of BMW OF NORTH AMERICA, INC.

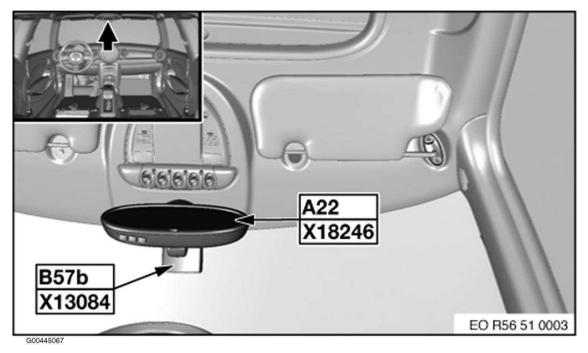


Fig. 37: Rear View Mirror Courtesy of BMW OF NORTH AMERICA, INC.

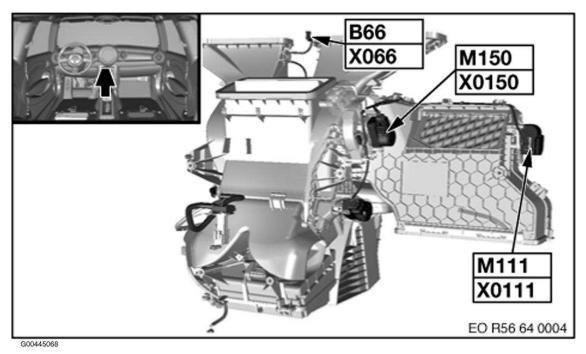


Fig. 38: Center Of Dash Courtesy of BMW OF NORTH AMERICA, INC.

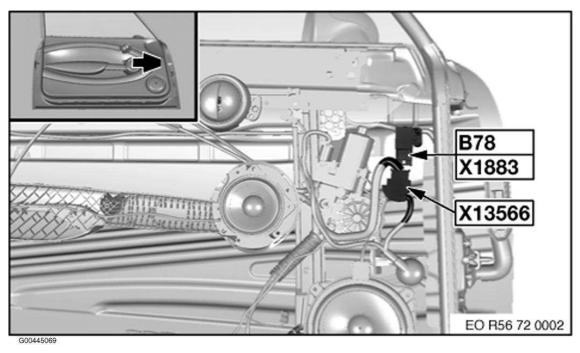
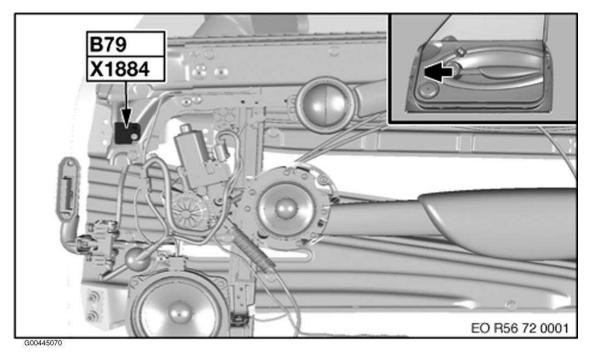


Fig. 39: Driver's Door Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 40: Passenger's Door</u> Courtesy of BMW OF NORTH AMERICA, INC.

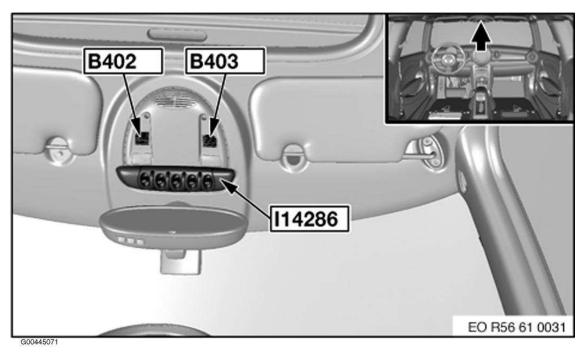
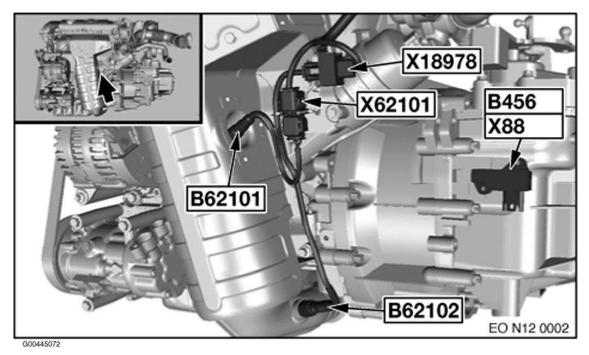


Fig. 41: Overhead Console Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 42: Left Side Of Engine (Except Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

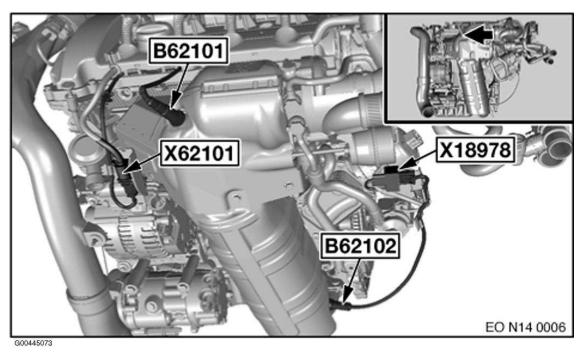
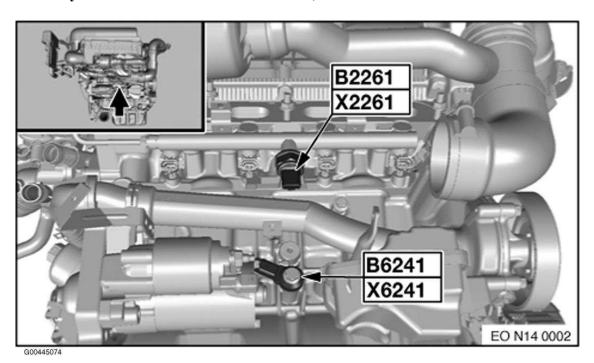


Fig. 43: Left Side Of Engine (Supercharged)
Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 44: Right Side Of Engine (Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

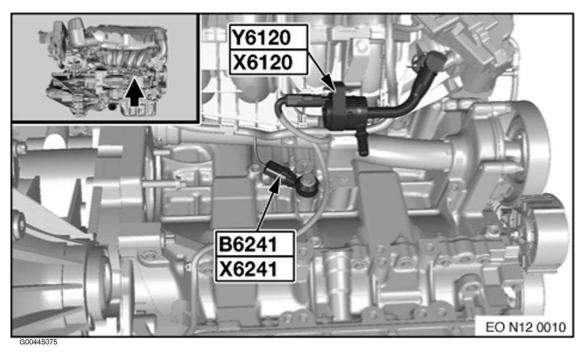
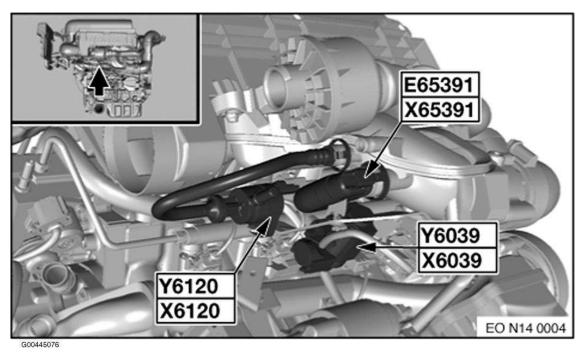


Fig. 45: Right Side Of Engine (Except Supercharged) Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 46: Right Side Of Engine (Except Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

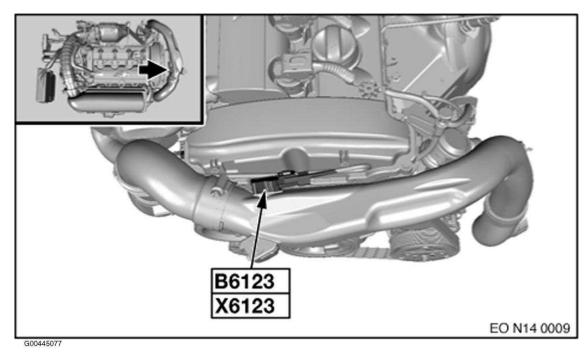
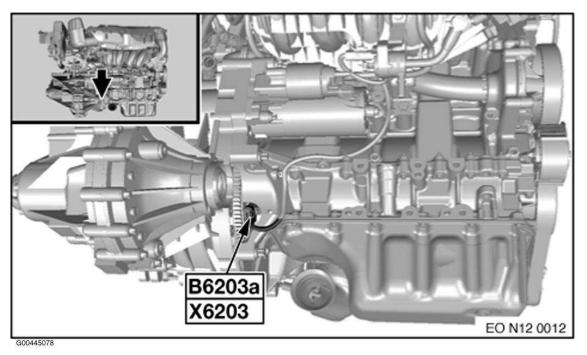


Fig. 47: Front Of Engine (Supercharged)
Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 48: Right Side Of Engine (Except Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

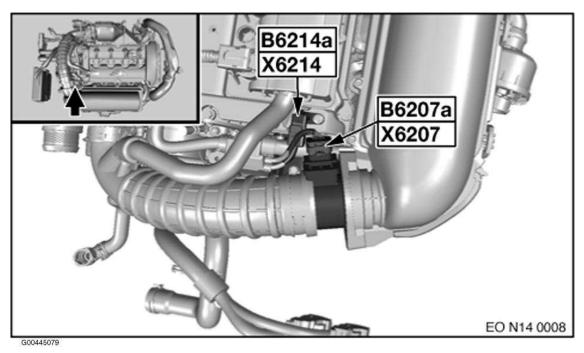
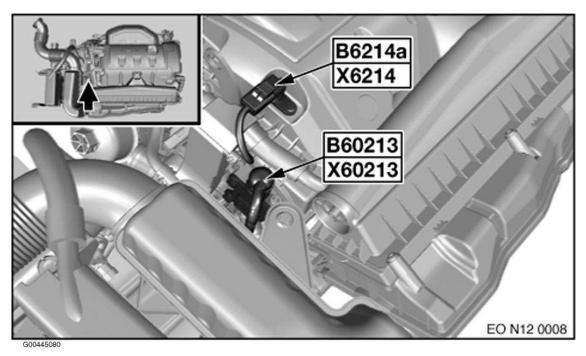


Fig. 49: Rear Of Engine (Supercharged)
Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 50: Rear Of Engine (Except Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

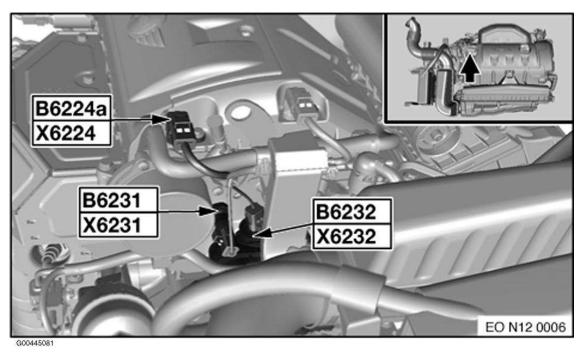
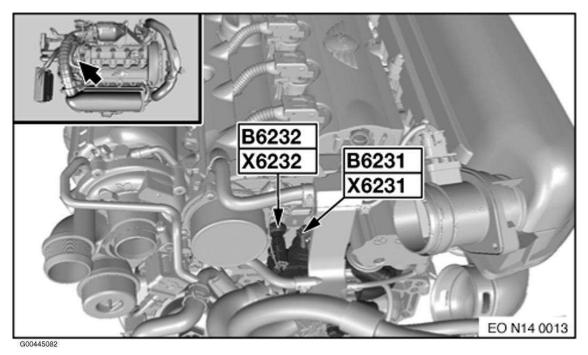
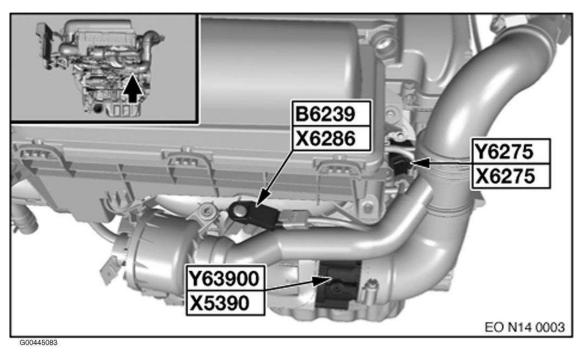


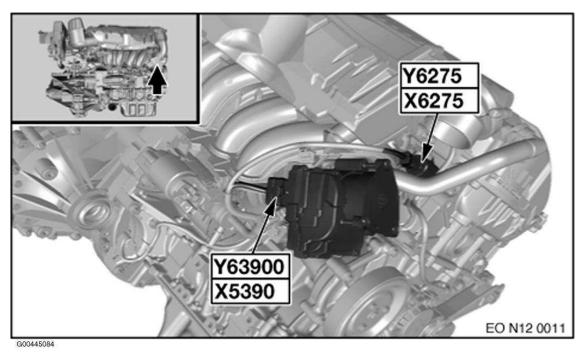
Fig. 51: Rear Of Engine (Except Supercharged)
Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 52: Rear Of Engine (Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 53: Right Side Of Engine (Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 54: Front Of Engine (Except Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

2008 MINI Cooper

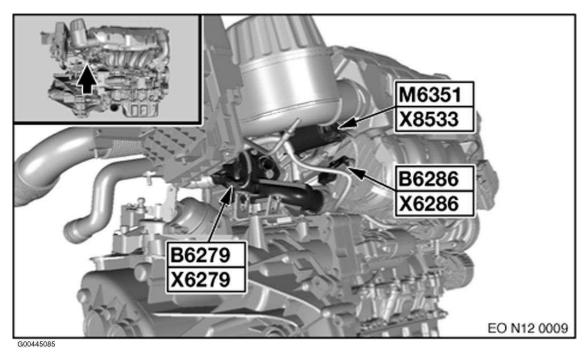
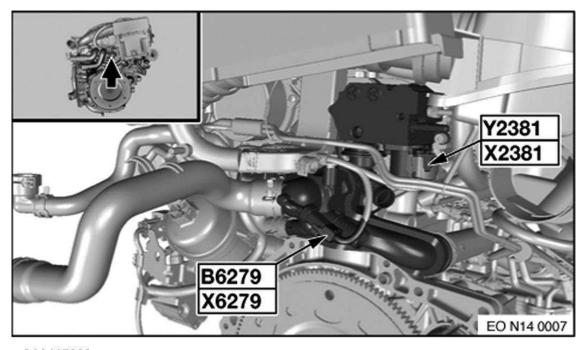


Fig. 55: Rear Of Engine (Except Supercharged)
Courtesy of BMW OF NORTH AMERICA, INC.



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<u>Fig. 56: Rear Of Engine (Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

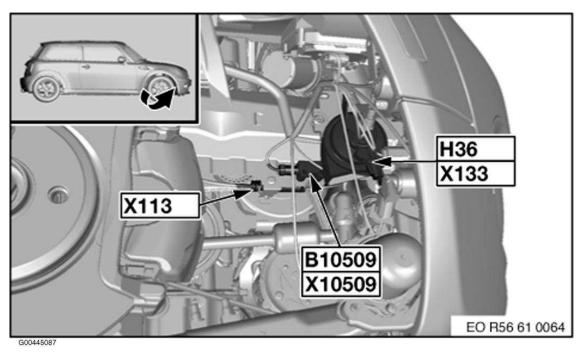


Fig. 57: Right Front Wheel Courtesy of BMW OF NORTH AMERICA, INC.

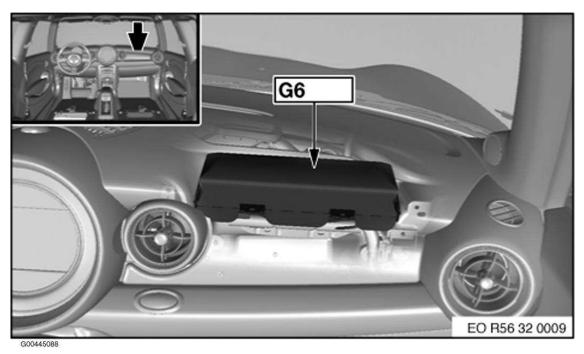


Fig. 58: Right Side Of Dash Courtesy of BMW OF NORTH AMERICA, INC.

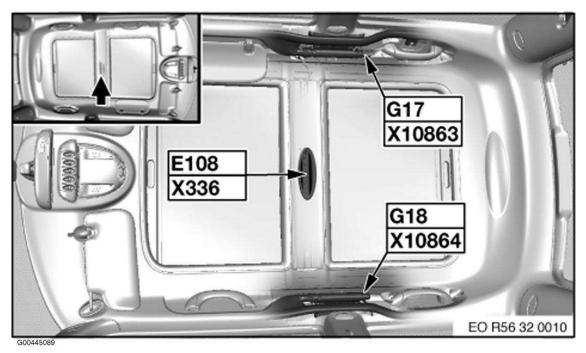
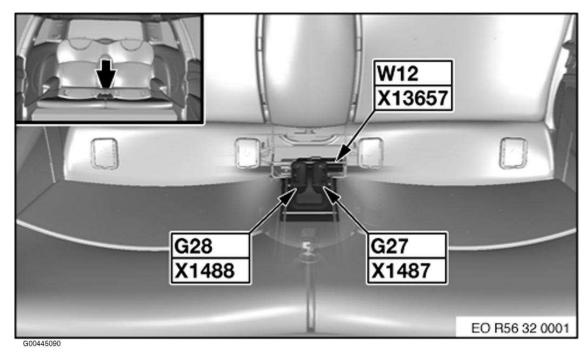
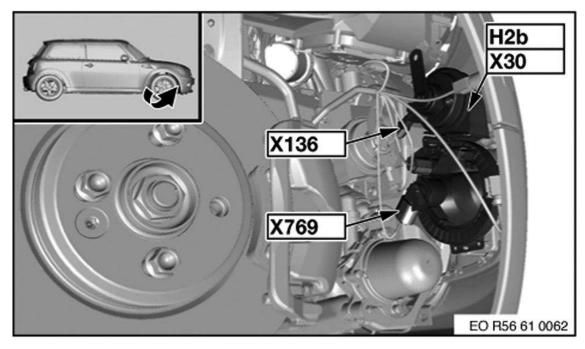


Fig. 59: Center Of Roof Courtesy of BMW OF NORTH AMERICA, INC.



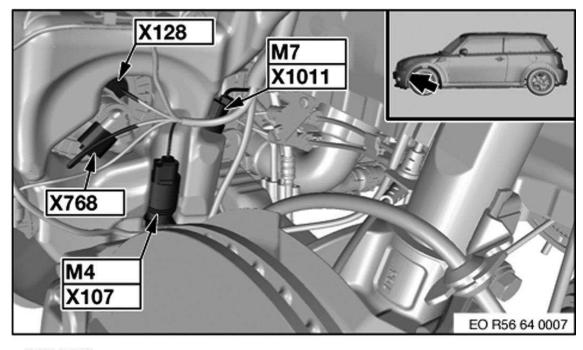
<u>Fig. 60: Center Of Rear Seats</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Fig. 61: Right Front Wheel Courtesy of BMW OF NORTH AMERICA, INC.



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<u>Fig. 62: Left Front Wheel</u> Courtesy of BMW OF NORTH AMERICA, INC.

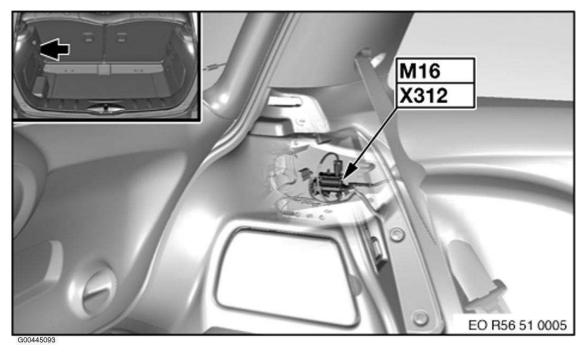
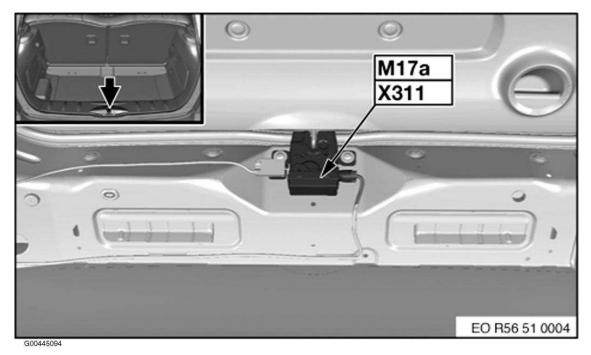
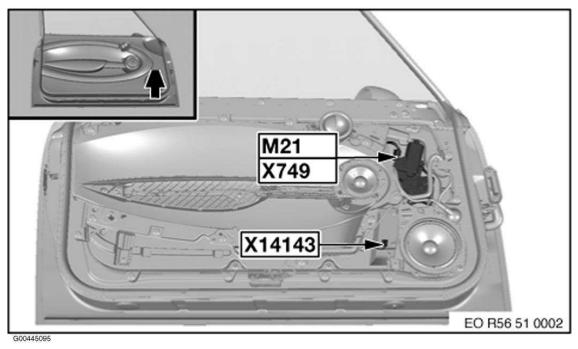


Fig. 63: Rear Compartment Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 64: Rear Compartment</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 65: Driver's Door</u> Courtesy of BMW OF NORTH AMERICA, INC.

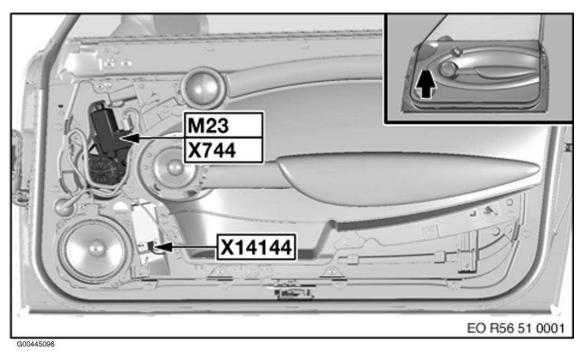


Fig. 66: Passenger's Door Courtesy of BMW OF NORTH AMERICA, INC.

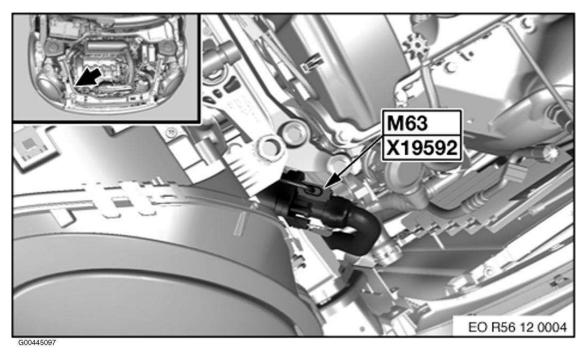
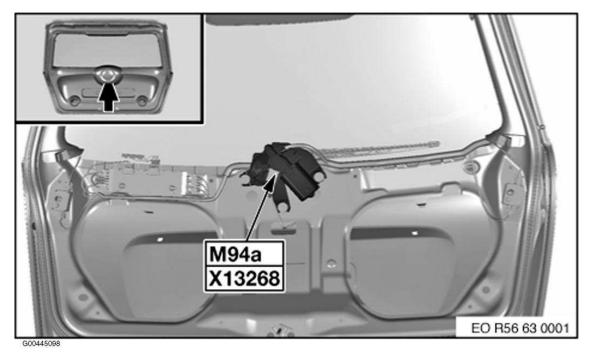


Fig. 67: Right Front Of Engine Compartment Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 68: Rear Compartment Door</u> Courtesy of BMW OF NORTH AMERICA, INC.

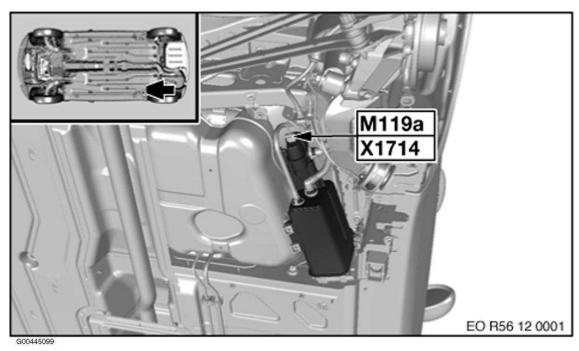
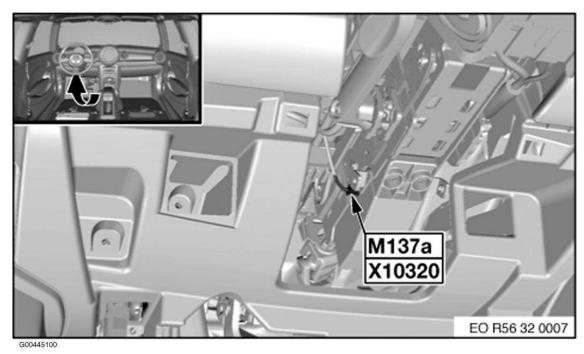


Fig. 69: Right Rear Wheel Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 70: Left Side Of Dash</u> Courtesy of BMW OF NORTH AMERICA, INC.

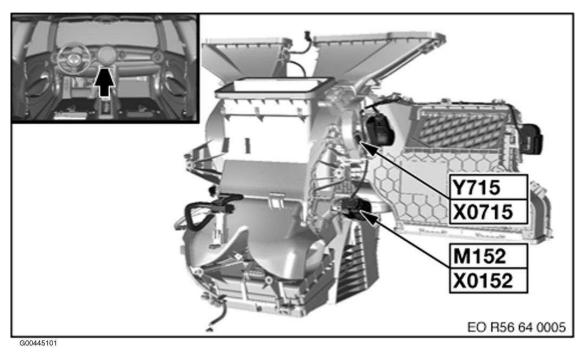
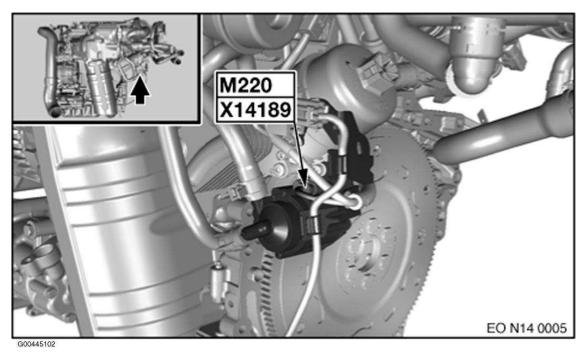


Fig. 71: Center Of Dash Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 72: Rear Of Engine (Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

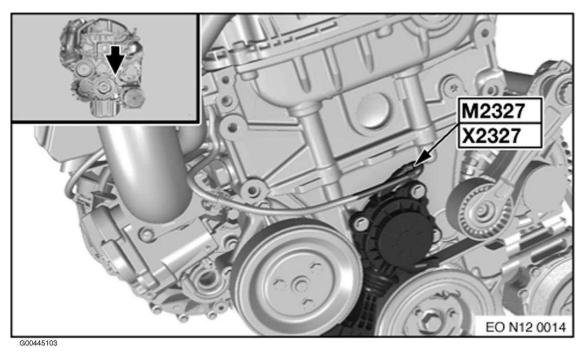


Fig. 73: Front Of Engine (Except Supercharged) Courtesy of BMW OF NORTH AMERICA, INC.

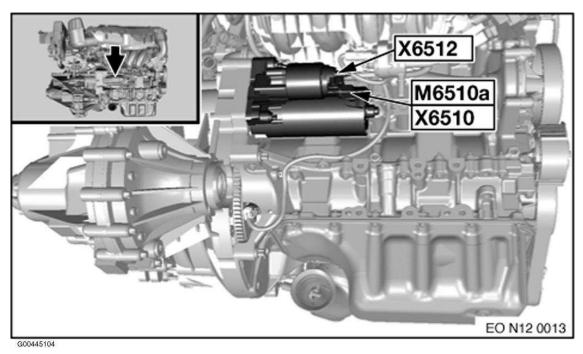
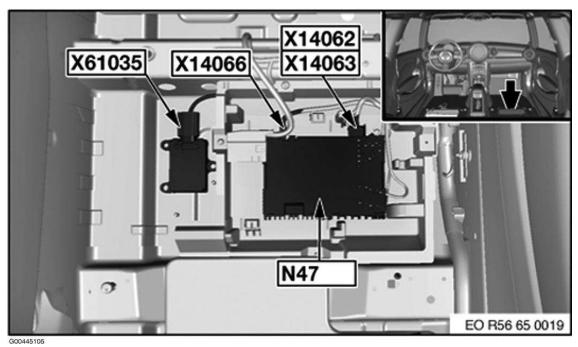
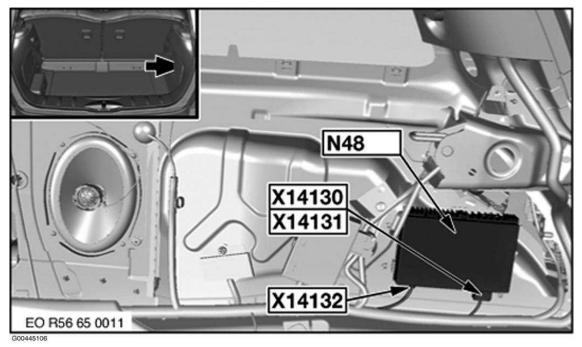


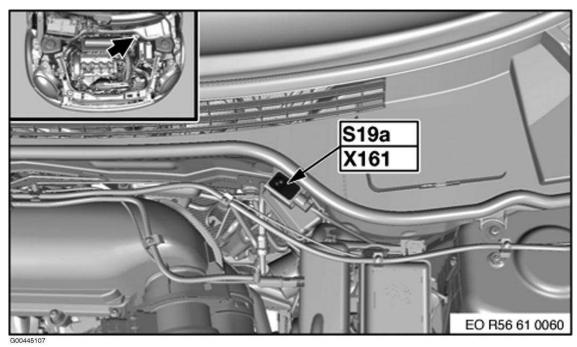
Fig. 74: Right Side Of Engine (Except Supercharged) Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 75: Under Passenger's Seat</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 76: Rear Compartment</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 77: Left Rear Of Engine Compartment</u> Courtesy of BMW OF NORTH AMERICA, INC.

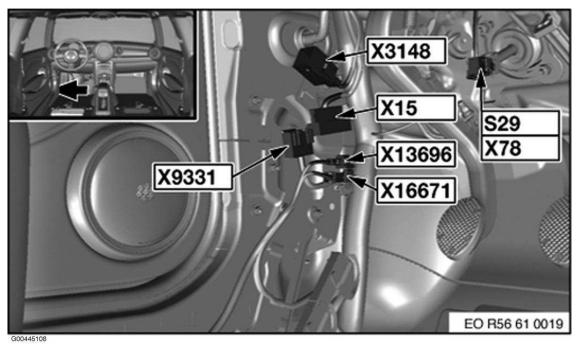


Fig. 78: Left Footwell Courtesy of BMW OF NORTH AMERICA, INC.

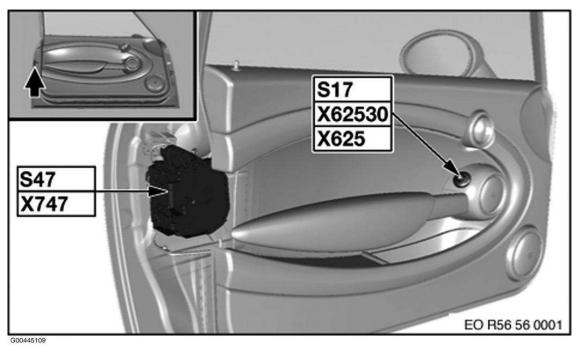
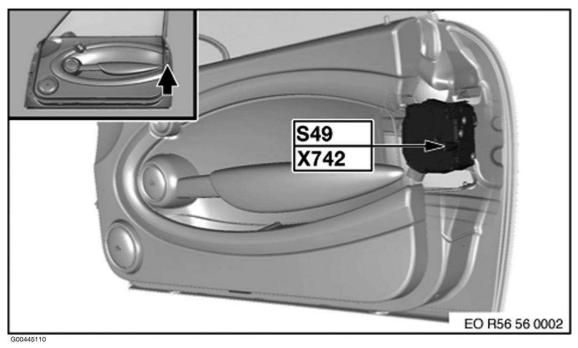
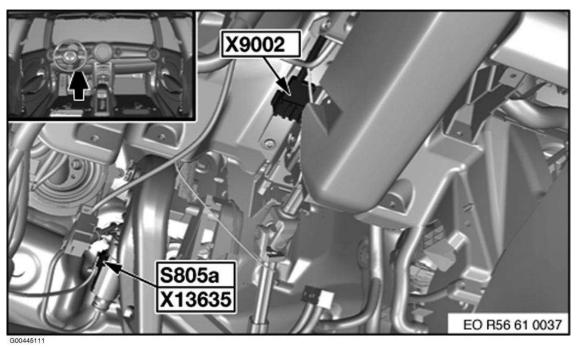


Fig. 79: Driver's Door Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 80: Passenger's Door</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 81: Left Side Of Dash</u> Courtesy of BMW OF NORTH AMERICA, INC.

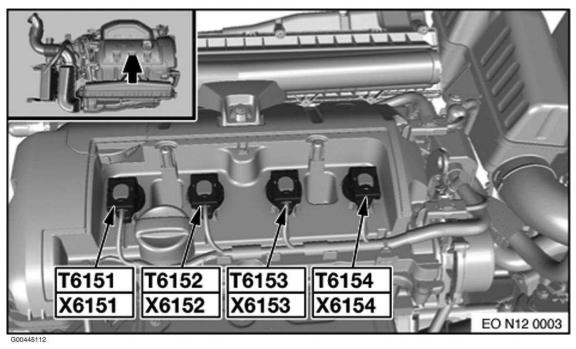
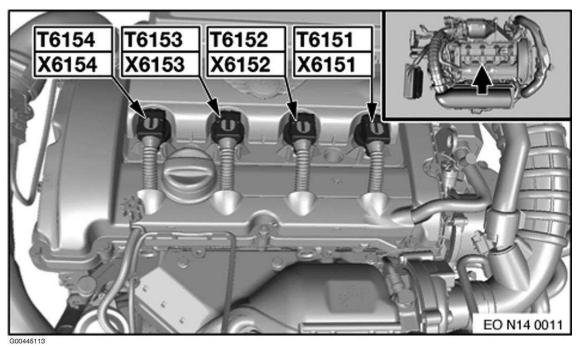


Fig. 82: Top Of Engine (Except Supercharged)
Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 83: Top Of Engine (Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

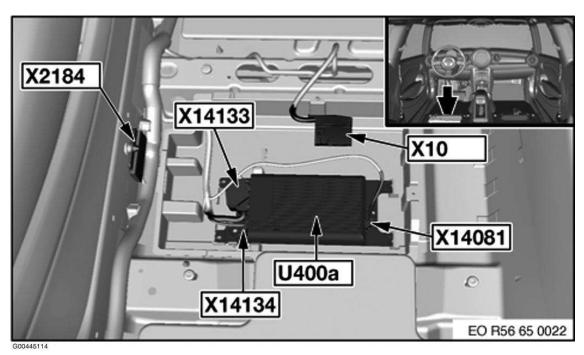


Fig. 84: Under Driver's Seat Courtesy of BMW OF NORTH AMERICA, INC.

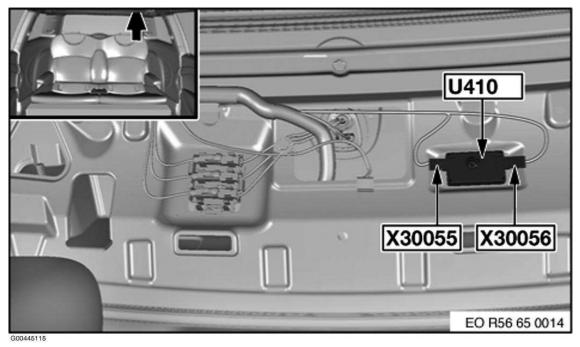


Fig. 85: Left Rear Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

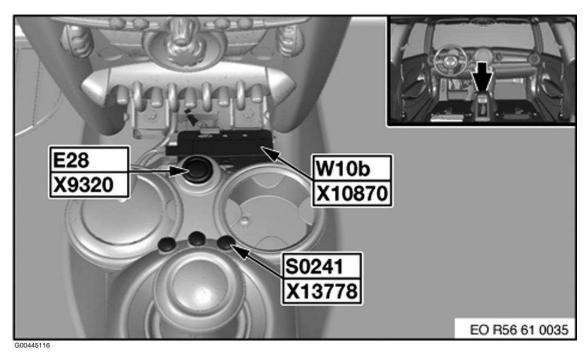


Fig. 86: Center Console Courtesy of BMW OF NORTH AMERICA, INC.

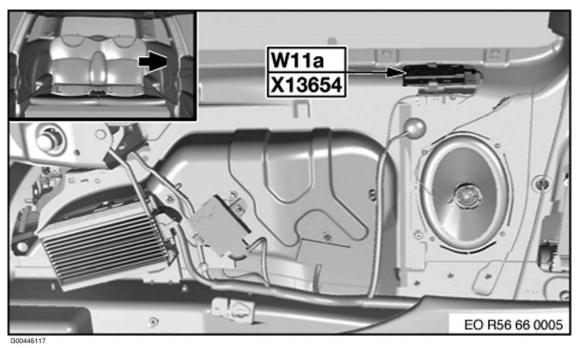


Fig. 87: Left Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

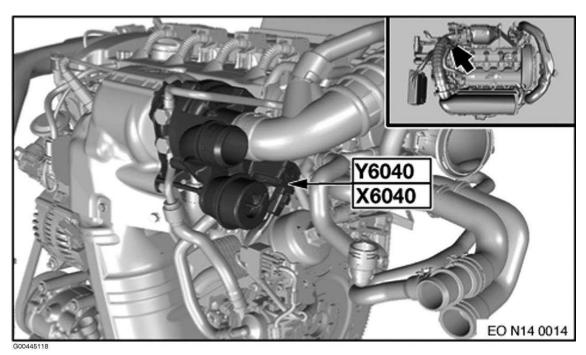
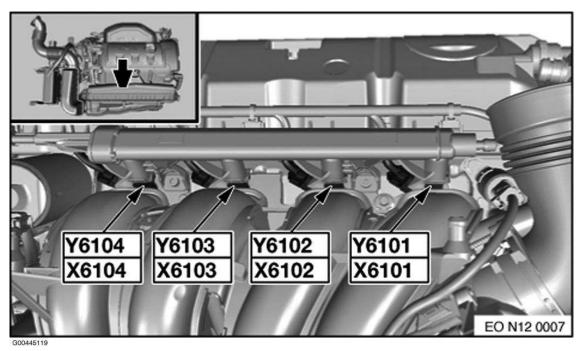


Fig. 88: Rear Of Engine (Supercharged)
Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 89: Right Side Of Engine (Except Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

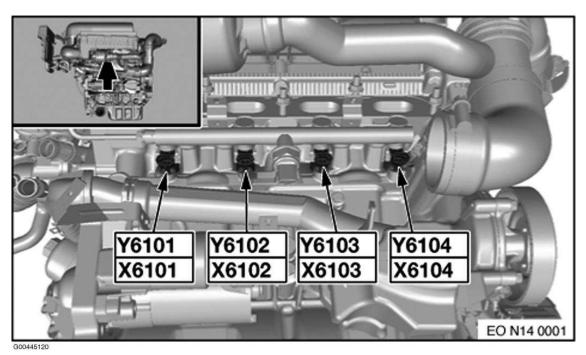
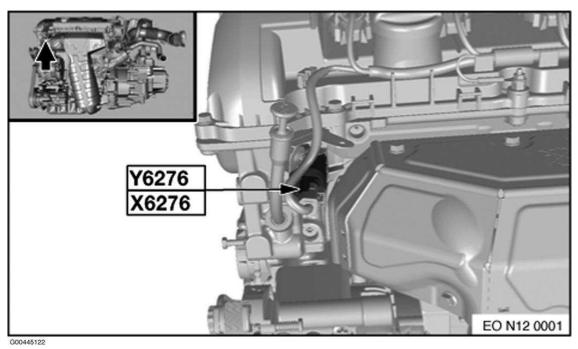


Fig. 90: Right Side Of Engine (Supercharged) Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 91: Right Side Of Engine (Except Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.

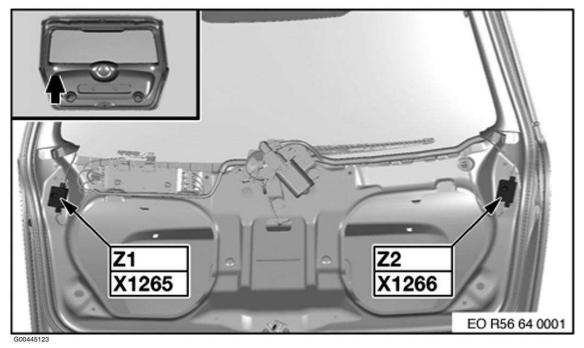
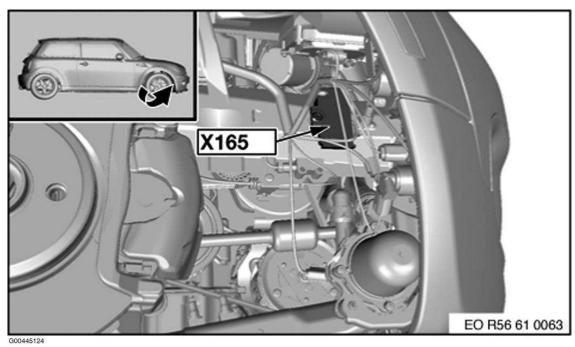


Fig. 92: Rear Compartment Door Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 93: Right Front Wheel</u> Courtesy of BMW OF NORTH AMERICA, INC.

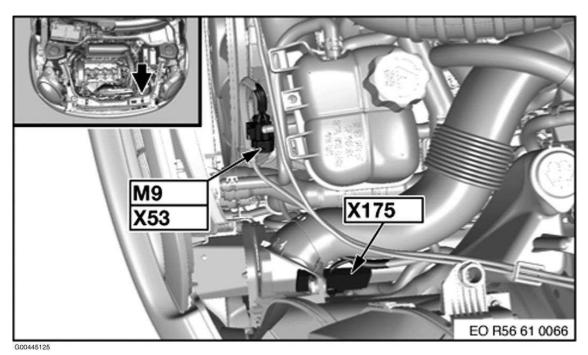
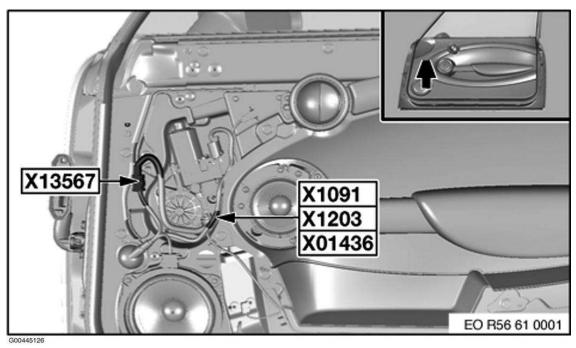


Fig. 94: Left Front Of Engine Compartment Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 95: Passenger's Door</u> Courtesy of BMW OF NORTH AMERICA, INC.

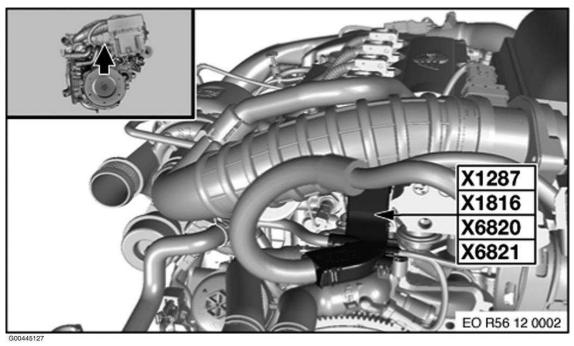
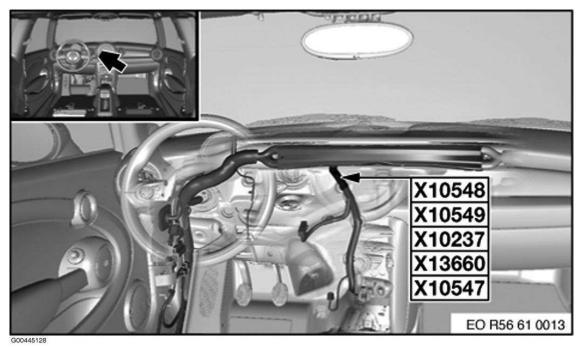
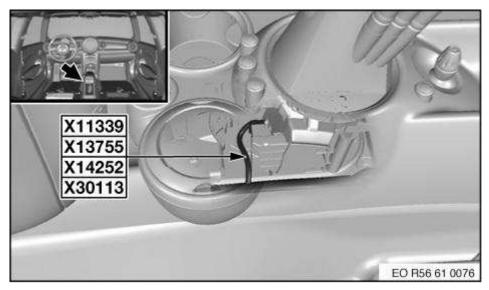


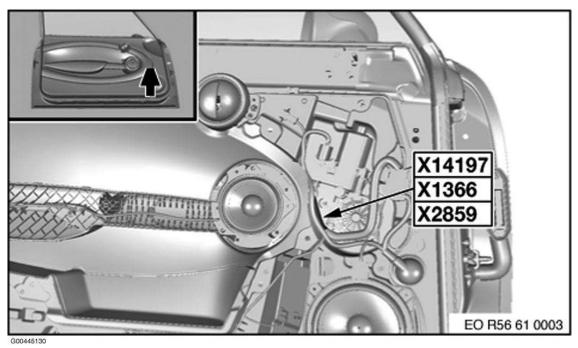
Fig. 96: Rear Of Engine Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 97: Center Of Dash</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 98: Center Of Dash</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 99: Driver's Door</u> Courtesy of BMW OF NORTH AMERICA, INC.

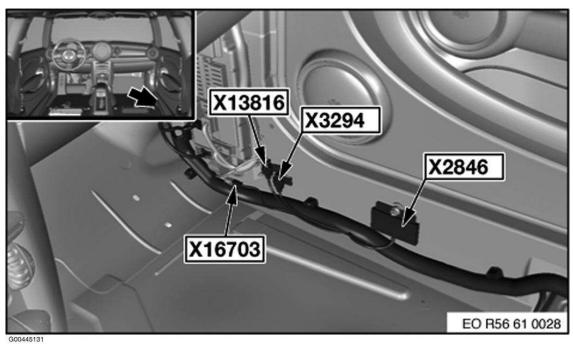


Fig. 100: Right Footwell Courtesy of BMW OF NORTH AMERICA, INC.

2008 MINI Cooper



<u>Fig. 101: Right Side Of Dash</u> Courtesy of BMW OF NORTH AMERICA, INC.

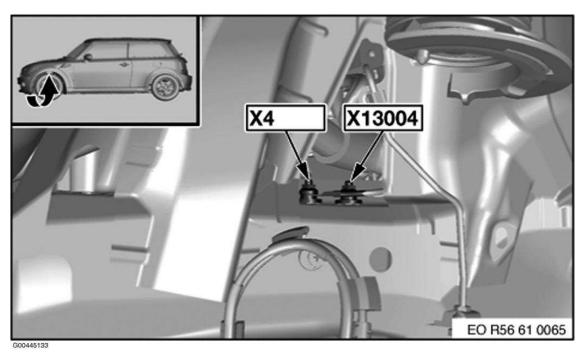
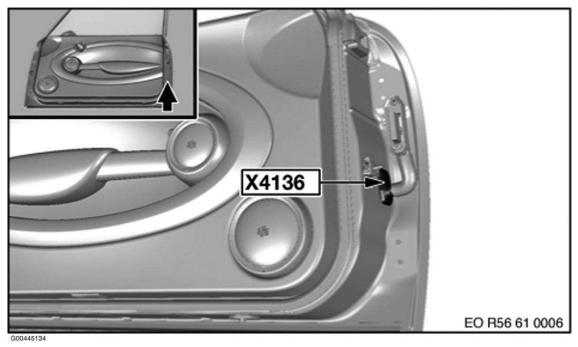


Fig. 102: Left Front Wheel Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 103: Passenger's Door</u> Courtesy of BMW OF NORTH AMERICA, INC.

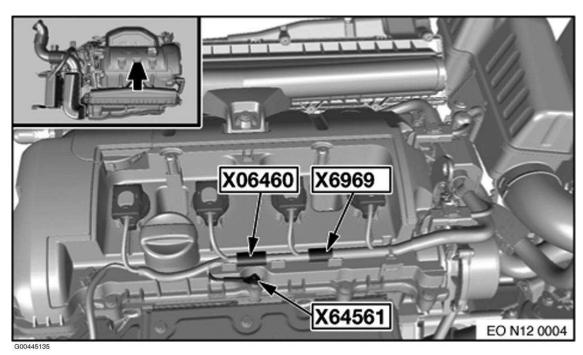
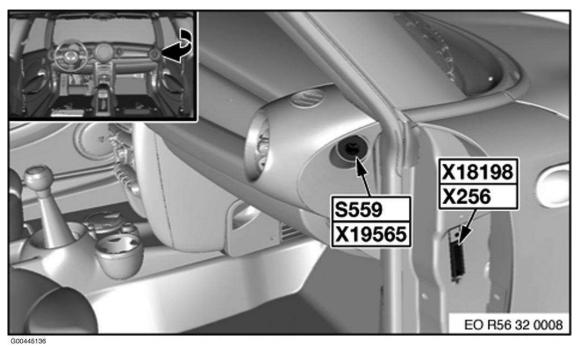


Fig. 104: Top Of Engine (Except Supercharged) Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 105: Right Side Of Dash</u> Courtesy of BMW OF NORTH AMERICA, INC.

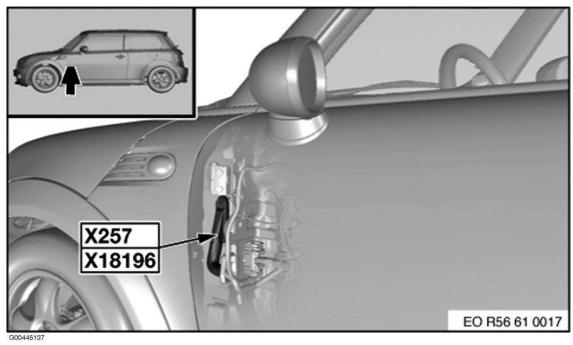
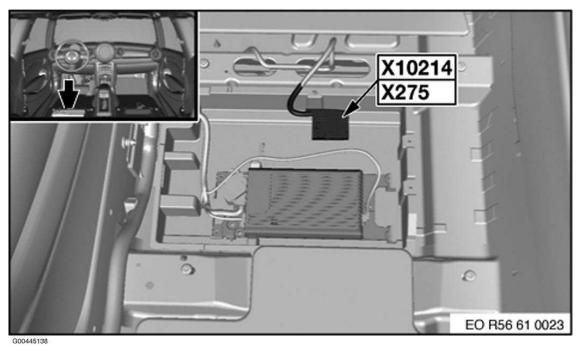


Fig. 106: Driver's Door Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 107: Under Driver's Seat</u> Courtesy of BMW OF NORTH AMERICA, INC.

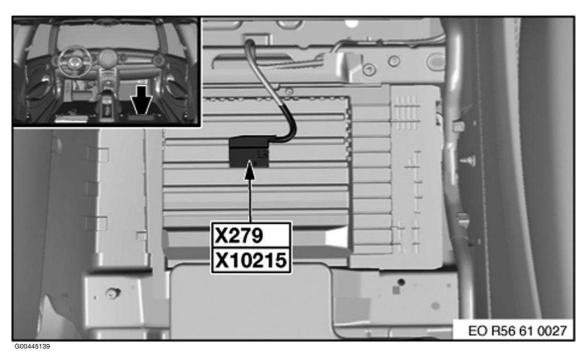


Fig. 108: Under Passenger's Seat Courtesy of BMW OF NORTH AMERICA, INC.

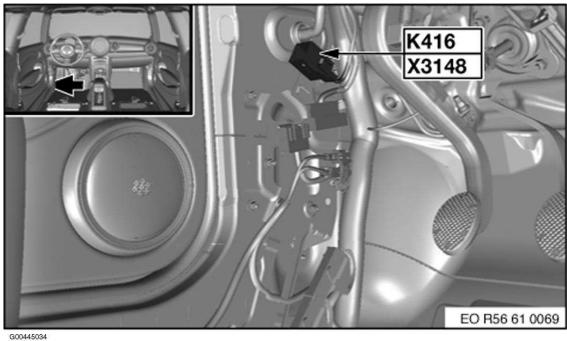


Fig. 109: Left Footwell **Courtesy of BMW OF NORTH AMERICA, INC.**

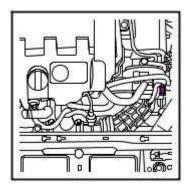


Fig. 110: Behind Right Rear Trim Panel Courtesy of BMW OF NORTH AMERICA, INC.

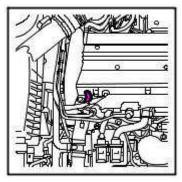


Fig. 111: Rear Bumper Courtesy of BMW OF NORTH AMERICA, INC.

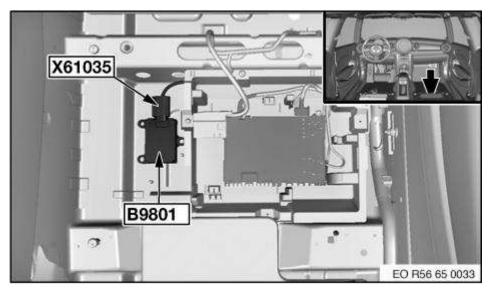
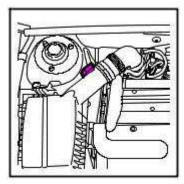
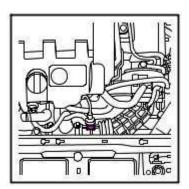


Fig. 112: Right Passenger Floor
Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 113: Right Rear Side Of Engine (Supercharged)</u> Courtesy of BMW OF NORTH AMERICA, INC.



<u>Fig. 114: Center Rear Of Lift Gate</u> Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 115: Center Rear Of Lift Gate
Courtesy of BMW OF NORTH AMERICA, INC.

2007 ACCESSORIES AND EQUIPMENT Electrical Drives - Repair Instructions - Cooper

2007 ACCESSORIES AND EQUIPMENT

Electrical Drives - Repair Instructions - Cooper

00 ELECTRIC DRIVES

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

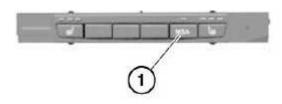
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



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Fig. 1: MSA Button Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

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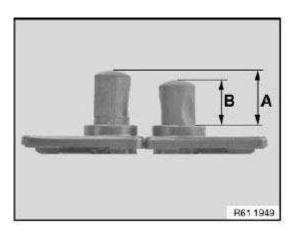


Fig. 2: Engine Hood/Bonnet Contact Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

11 CENTRAL LOCKING UNIT/UNLOCKING

67 11 510 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR FRONT LEFT OR RIGHT DOOR LOCKING MECHANISM

This procedure is described in the document "Removing and installing/replacing door lock in left or right front door". See <u>51 21 090 REMOVING AND INSTALLING/REPLACING DOOR LOCK IN LEFT OR RIGHT FRONT DOOR</u>

67 11 555 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR TANK FILLER FLAP

Necessary preliminary tasks:

• Remove left rear light

Unlock catches (1) and remove cover (2).

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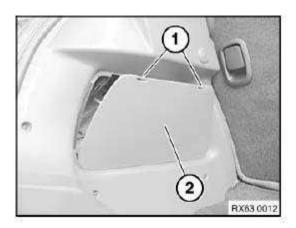


Fig. 3: Catches And Cover Courtesy of BMW OF NORTH AMERICA, INC.

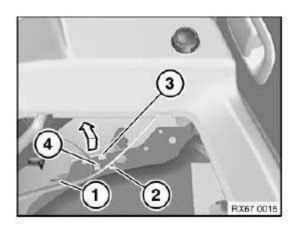
Unfasten plug connection (1) and disconnect.

Release screw (2).

Slide servodrive for tank filler flap (3) upwards slightly and feed towards rear out of retaining plate.

Installation:

Make sure plastic retainer (4) is correctly seated in retaining plate.



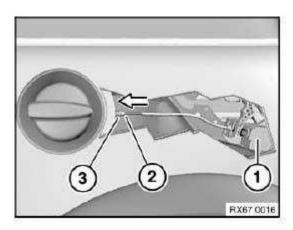
<u>Fig. 4: Tank Filler Flap And Plastic Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carry out feed-in operation through rear light opening in rear side panel.

Insert servodrive for tank filler flap (1) with locking pin (2) into gaiter (3).

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<u>Fig. 5: Tank Filler Flap With Locking Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Unclip emergency actuator (1) in direction of arrow from servodrive for tank filler flap (2).

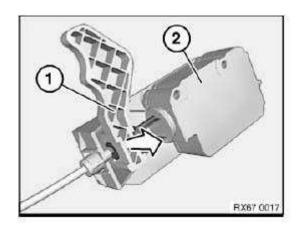


Fig. 6: Emergency Actuator And Tank Filler Flap Courtesy of BMW OF NORTH AMERICA, INC.

13 MIRROR ADJUSTMENT

67 13 001 REPLACING DRIVE UNIT FOR ELECTRICALLY OPERATED LEFT OR RIGHT DOOR MIRROR

Necessary preliminary tasks:

• Remove mirror glass

Release screws (1).

Remove drive (2) and disconnect associated plug connection.

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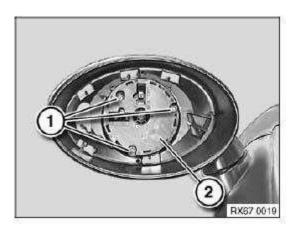


Fig. 7: Screws And Drive Courtesy of BMW OF NORTH AMERICA, INC.

61 DRIVE, SLIDE TILT SUNROOF CONV. TOP

67 61 515 REPLACING DRIVE WITH GEAR FOR ACTUATING SLIDE/TILT SUNROOF

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

Necessary preliminary tasks:

• Remove roof operating unit

Release screw (1).

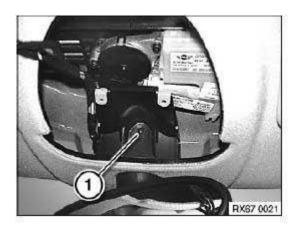


Fig. 8: Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Press bracket (2) downwards slightly.

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Feed out drive (3) and disconnect associated plug connection.

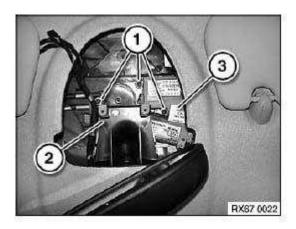


Fig. 9: Screws And Bracket Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out programming/coding.

Initialize slide/tilt sunroof.

62 DRIVE, WINDOW REGULATOR

67 62 000 REMOVING AND INSTALLING OR REPLACING FLAT MOTOR FOR FRONT LEFT OR RIGHT POWER WINDOW UNIT

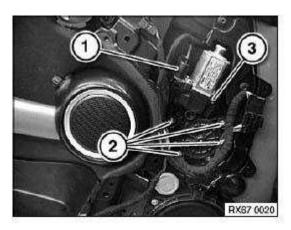
Necessary preliminary tasks:

• Remove front door trim panel

Disconnect plug connection (1).

Release screws (2) and remove flat motor (3).

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<u>Fig. 10: Screws And Flat Motor</u> Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

Check function.

Flat motor does not have to be initialized.

63 DRIVE UNIT, HEADLIGHT

67 63 510 REMOVING AND INSTALLING / REPLACING WIPER MOTOR

This procedure is described in the document "Removing and installing bracket for windscreen wiper system complete with motor". See <u>61 61 270 REMOVING AND INSTALLING COMPLETE WIPER CONSOLE</u>

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2007 ENGINE

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00 ENGINE GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- o Dizziness
- Stomach aches
- Vomiting
- o Diarrhoea
- o Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

• Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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- Impaired sight
- Irritation of the eyes
- o Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eyerinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start may ensue.

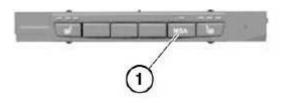
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

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R61 1948

<u>Fig. 1: Passenger Compartment MSA Button</u> Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

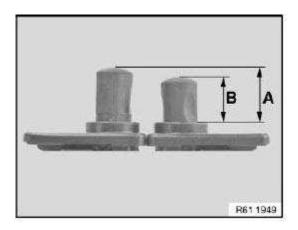


Fig. 2: Engine Hood Contact Workshop And Basic Mode Settings Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: <u>Danger Of Poisoning</u> if oil is ingested/absorbed through the skin!

2007 ENGINE Engine - Repair Instructions - Cooper S

Risk Of Injury if oil comes into contact with eyes and skin!

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N14)

Release screws (1).

For tightening torque refer to 11 12 11AZ in 11 12 CYLINDER HEAD WITH COVER.

Release acoustic cover at retainers (2).

Lift off acoustic cover in direction of arrow.

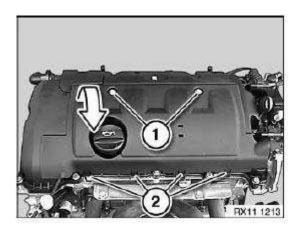


Fig. 3: Acoustic Cover Retainers, Screws And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

11 00 039 CHECKING COMPRESSION OF ALL CYLINDERS (N12, N14)

Read out fault memory of DME control unit

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- Check stored faults
- Rectify faults
- o Clear fault memory

IMPORTANT: High tension - mortal danger!

Interrupt power supply to ignition coils.

Read and comply with notes on compression pressure check.

Necessary preliminary tasks:

• Remove Spark Plugs .

Unscrew tip (1) from special tool 11 0 222.

IMPORTANT: Then check the Schrader valve that is now visible for secure seating.

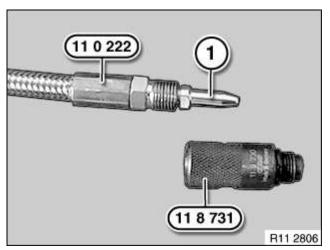


Fig. 4: Tip, Special Tools (11 0 222) And (11 8 731) Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 0 222 in conjunction with 11 8 732 and 11 8 731.

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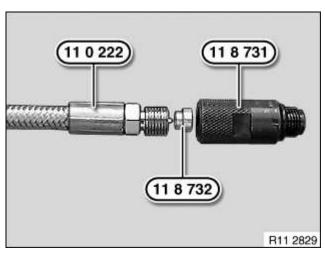


Fig. 5: Special Tools (11 0 222), (11 8 732) And (11 8 731) Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 8 730 onto special tool 11 0 222 to 10 Nm.

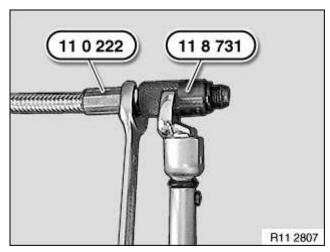


Fig. 6: Special Tools (11 0 222) And (11 8 731) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not forget to oil spark plug thread of special tool 11 8 731.

Screw special tool 11 0 222 by hand into spark plug thread and connect special tool 11 0 224.

Use adapter lead (1) if the compression pressure is being checked with the BMW diagnosis system.

Depress accelerator pedal and actuate starter until compression pressure stops rising.

• Nominal values, compression pressure

Assemble engine

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Now clear the fault memory.

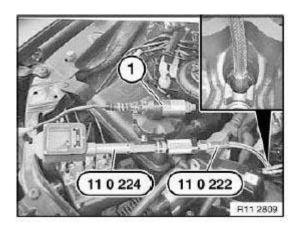


Fig. 7: Adapter Lead, Special Tools (11 0 222) And (11 0 224) Courtesy of BMW OF NORTH AMERICA, INC.

11 00 050 REMOVING AND INSTALLING ENGINE (N14)

Special tools required:

• 11 0 260

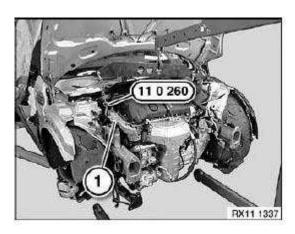
Necessary preliminary tasks:

- Remove Exhaust System .
- Drain Engine Oil .
- Disconnect negative battery lead.
- Remove both **Left** and **Right** output shafts .
- Remove Air Cleaner Housing .
- Detach all coolant hoses from engine.
- Detach vacuum line from brake booster.
- Unfasten **Engine Wiring Harness** and lay to one side.
- Remove complete Front Panel

Attach special tool 11 0 260 to lifting eye (1) on engine.

NOTE: Pictures show N12.

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<u>Fig. 8: Engine Lifting Eye And Special Tool (11 0 260)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 0 260 to lifting eye (1) at transmission end.

NOTE: Pictures show N12.

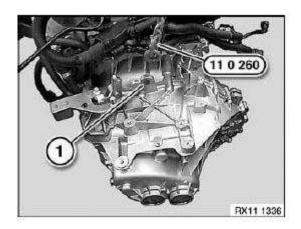


Fig. 9: Engine Lifting Eye And Special Tool (11 0 260) Courtesy of BMW OF NORTH AMERICA, INC.

Remove engine with special tool 11 0 260 towards front.

NOTE: Pictures show N12.

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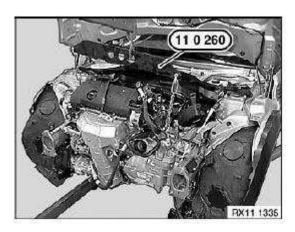


Fig. 10: Special Tool (11 0 260)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N12, N14)

Special Tools Required:

- 00 0 200
- 00 0 202
- 00 0 204
- 00 0 208
- 00 0 490

WARNING: Risk of injury!

Observe following instructions relating to special tool:

- 1. Prior to each use, check the special tools for defects, modifications and operational reliability.
- 2. Damaged/modified special tools must not be used!
- 3. No changes or modifications may be made to the special tools!
- 4. Keep special tools dry, clean and free of grease.

Necessary preliminary tasks:

Remove <u>Lock Bridge</u>

Assemble cross member 00 0 200 with special tools 00 0 202, 00 0 204, 00 0 208.

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Modification:

Remove front supports (1).

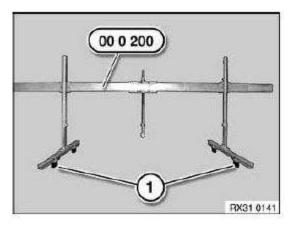


Fig. 11: Front Supports And Special Tool (00 0 200) Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 00 0 490 on left and right to cross member 00 0 200.

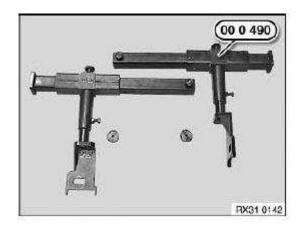


Fig. 12: Special Tool (00 0 490)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not damage Bowden cable (1)!

With the aid of an assistant, place cross member 00 0 200 on spring strut tower and secure special tool 00 0 490 with knurled screws (2) on engine support.

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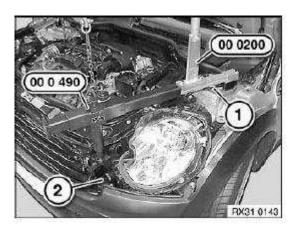


Fig. 13: Bowden Cable, Knurled Screws, Special Tools (00 0 200) And (00 0 490) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction.

Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

Align cross member 00 0 200 such that the spindle 00 0 202 is positioned correctly over the lifting eye.

Secure suitable chain to spindle 00 0 200 and attach to lifting eye (1).

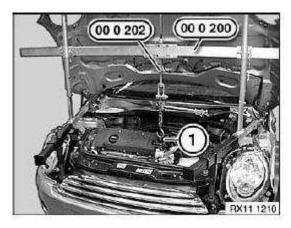


Fig. 14: Special Tools (00 0 200) And (00 0 202) Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!

Tighten all adjusting screws, knurled screws and nuts on cross member 00 0 200 and on special tool 00 0 490.

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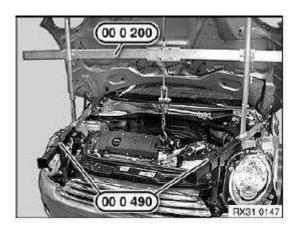


Fig. 15: Special Tool (00 0 200) And (00 0 490) Courtesy of BMW OF NORTH AMERICA, INC.

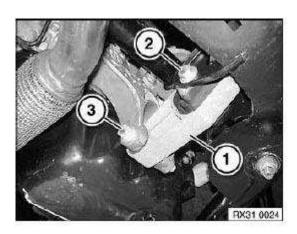
IMPORTANT: Bolts must be slackened to prevent elongation of rubber mounts in bracket (1)!

Slacken bolts (2, 3).

Installation:

Low engine first onto engine or transmission mounts and then tighten down bolts (2, 3).

For tightening torque refer to 22 11 6AZ in 22 11 ENGINE SUSPENSION.



<u>Fig. 16: Bracket And Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Left side only:

Remove **Transmission Support Bracket**

Right side only:

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Unscrew nut (1).

Installation:

Replace self-locking nut.

For tightening torque refer to 22 11 2AZ in 22 11 ENGINE SUSPENSION.

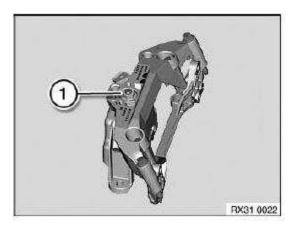


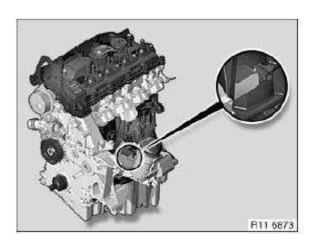
Fig. 17: Mounting Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Raise engine approx. 10 mm with cross member.

ENGINE IDENTIFICATION

Drive in engine numbers at marked surface with impact tool.

M47 / M47TU / M47T2



<u>Fig. 18: Engine Numbers Location - M47 / M47TU / M47T2</u> Courtesy of BMW OF NORTH AMERICA, INC.

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M57 / M57TU / M57T2

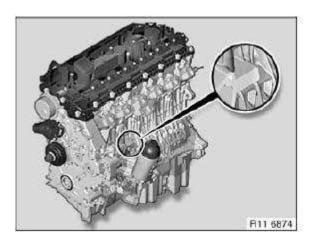
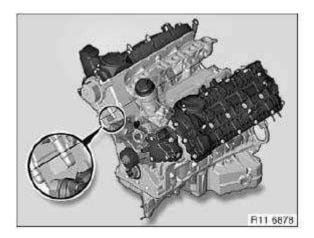


Fig. 19: Engine Numbers Location - M57 / M57TU / M57T2 Courtesy of BMW OF NORTH AMERICA, INC.

M67 / M67TU



<u>Fig. 20: Engine Numbers Location - M67 / M67TU</u> Courtesy of BMW OF NORTH AMERICA, INC.

N47 / N47S

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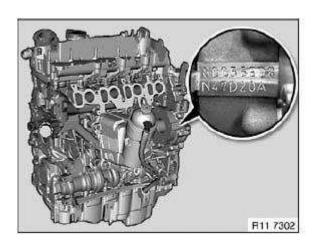


Fig. 21: Engine Numbers Location - N47 / N47S Courtesy of BMW OF NORTH AMERICA, INC.

M52 / M52TU

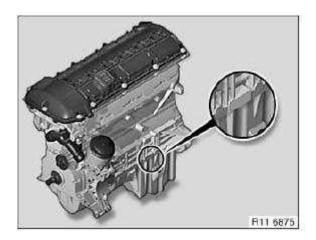
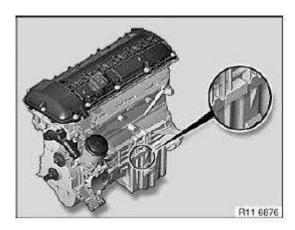


Fig. 22: Engine Numbers Location - M52 / M52TU Courtesy of BMW OF NORTH AMERICA, INC.

M54

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<u>Fig. 23: Identifying Engine Numbers Location - M54</u> Courtesy of BMW OF NORTH AMERICA, INC.

M56

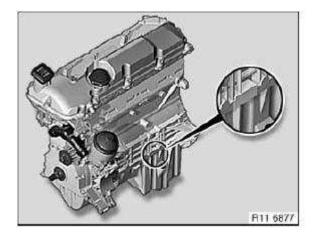


Fig. 24: Engine Numbers Location - M56 Courtesy of BMW OF NORTH AMERICA, INC.

N40 / N45 / N45T / N43

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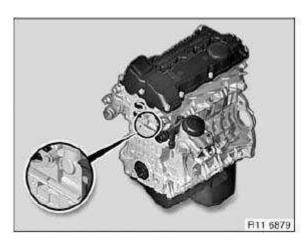
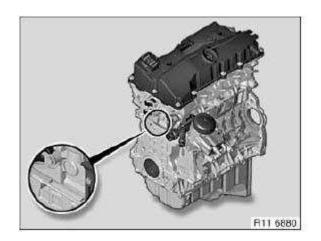


Fig. 25: Engine Numbers Location - N40 / N45 / N45T / N43 Courtesy of BMW OF NORTH AMERICA, INC.

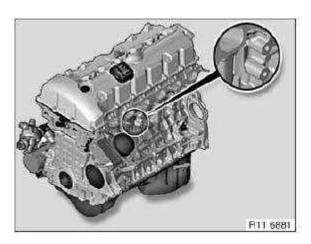
N42 / N46 / N46T



<u>Fig. 26: Engine Numbers Location - N42 / N46 / N46T</u> Courtesy of BMW OF NORTH AMERICA, INC.

N51 / N52 / N52K / N53 / N54

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<u>Fig. 27: Engine Numbers Location - N51 / N52 / N52K / N53 / N54</u> Courtesy of BMW OF NORTH AMERICA, INC.

N62

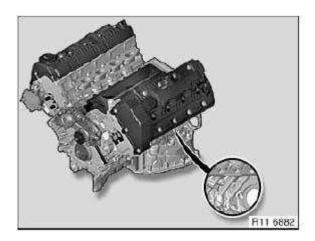
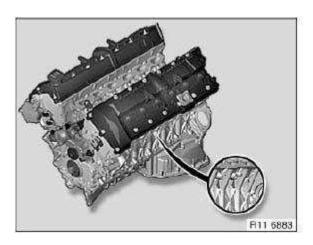


Fig. 28: Engine Numbers Location - N62 Courtesy of BMW OF NORTH AMERICA, INC.

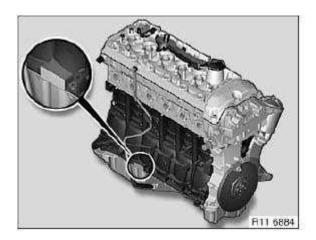
N73

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<u>Fig. 29: Engine Numbers Location - N73</u> Courtesy of BMW OF NORTH AMERICA, INC.

S54



<u>Fig. 30: Engine Numbers Location - S54</u> Courtesy of BMW OF NORTH AMERICA, INC.

S85 / S65

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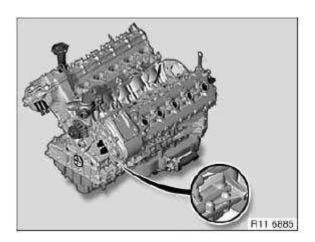


Fig. 31: Engine Numbers Location - S85 / S65 Courtesy of BMW OF NORTH AMERICA, INC.

W10 / W11

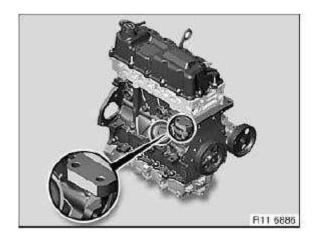
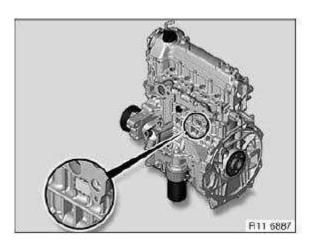


Fig. 32: Engine Numbers Location - W10 / W11 Courtesy of BMW OF NORTH AMERICA, INC.

W17

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<u>Fig. 33: Engine Numbers Location - W17</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

MOUNTING ENGINE ON ASSEMBLY STAND (N14)

Special tools required:

- 00 2 300
- 11 9 530

Necessary preliminary tasks:

• Remove **Engine**.

Bolt engine or engine block to special tool 11 9 530.

Mount engine with special tool 11 9 530 on special tool 00 2 300.

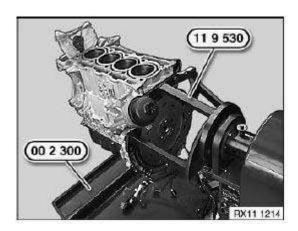


Fig. 34: Special Tools (11 9 530) And (00 2 300)

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Courtesy of BMW OF NORTH AMERICA, INC.

12 CYLINDER HEAD WITH COVER

11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N14)

Necessary preliminary tasks:

- Unclip **Ignition Wiring Harness** on cylinder head.
- Remove Rod-Type Ignition Coils .
- Remove **Suction Filter Housing** .

Unclip engine wiring harness with holders (1).

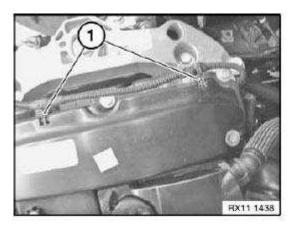
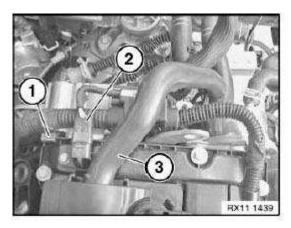


Fig. 35: Holders Courtesy of BMW OF NORTH AMERICA, INC.

Unclip engine wiring harness holder (1).



<u>Fig. 36: Engine Wiring Harness Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Release oxygen sensors on cylinder head (1).

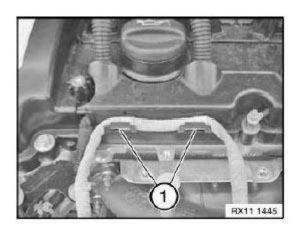


Fig. 37: Cylinder Head Oxygen Sensors Courtesy of BMW OF NORTH AMERICA, INC.

Detach grounding cable at bolt connection (2).

Undo cylinder head cover bolts in the sequence 13 to 1.

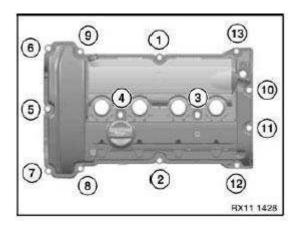


Fig. 38: Cylinder Head Cover Bolt Connection And Installation/Removal Sequence Courtesy of BMW OF NORTH AMERICA, INC.

Replace seal (1).

Replace all seals (2).

Installation:

Clean all sealing surfaces.

Installation:

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Seal all edges and joints on the cylinder head with sealing compound Drei Bond 1209.

NOTE: Pictures show N12.

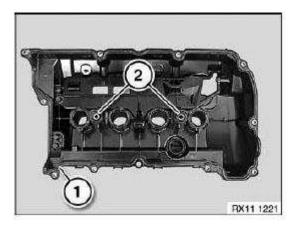
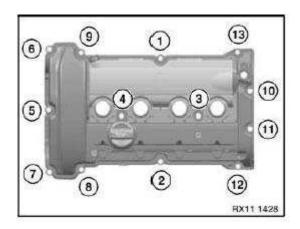


Fig. 39: Cylinder Head Seals Courtesy of BMW OF NORTH AMERICA, INC.

Secure bolts for cylinder head cover in sequence 1 to 13.

For tightening torque refer to 11 12 4AZ in 11 12 CYLINDER HEAD WITH COVER.



<u>Fig. 40: Cylinder Head Cover Bolt Connection And Installation/Removal Sequence</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 100 REMOVING AND INSTALLING/SEALING CYLINDER HEAD (N14)

Special tools required:

- 11 2 250
- 11 4 471

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- 11 4 472
- 11 9 590
- 11 9 630

IMPORTANT: Fit new cylinder head screws.

Do not wash off bolt coating.

There must not be any coolant, water or oil present in the pocket holes (risk of corrosion and cracking).

Necessary preliminary tasks:

- Remove Exhaust System .
- Drain Coolant.
- Drain Engine Oil .
- Remove intake air Manifold.
- Remove Oil Dipstick .
- Detach coolant hoses from cylinder head.
- Remove oil dipstick Guide Tube .
- Remove Cylinder Head Cover .
- Remove solenoid valve from adjustment unit.
- Remove Inlet Adjustment Unit .

Secure crankshaft with special tool 11 9 590.

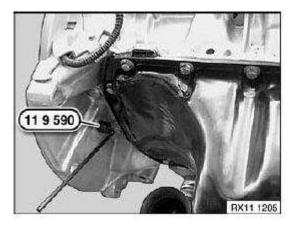


Fig. 41: Special Tool (11 9 590)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Remove and install cylinder head in installed state.

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Suspend engine with engine crane (1) from lifting eye (2).

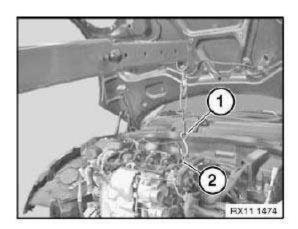


Fig. 42: Engine Crane And Lifting Eye Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Remove and install cylinder head in installed state.

Move front panel into <u>Assembly Position</u>.

Release upper Alternator Screws, do not remove alternator.

Remove right engine mount.

Secure special tool 11 9 630 with standard bolts (1 and 2).

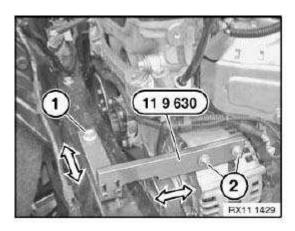


Fig. 43: Bolts, Special Tool (11 9 630) And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

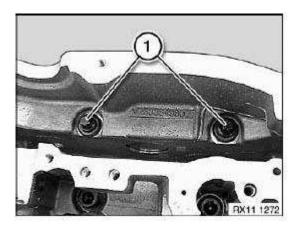
IMPORTANT: If the timing chain is stowed in the gearcase, the crankshaft must no longer be rotated.

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The timing chain may jam on the crankshaft gear.

Installation:

Only during assembly is the timing chain lifted out with a hook.



<u>Fig. 44: Timing Chain Mounting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

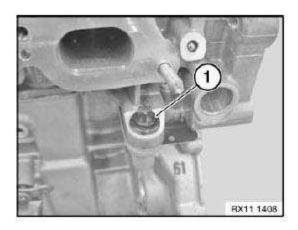


Fig. 45: Retaining Screw
Courtesy of BMW OF NORTH AMERICA, INC.

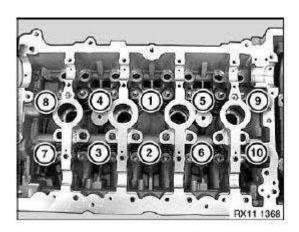
Release cylinder head bolts with special tool $11\ 2\ 250$.

Release cylinder head bolts from outside inwards (10 to 1).

NOTE: Remove shims with a magnet.

Illustration shows camshafts removed.

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<u>Fig. 46: Cylinder Head Bolts And Removal/Installation Sequence</u> Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool 11 4 471 to remove coarse gasket remnants from sealing faces of cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

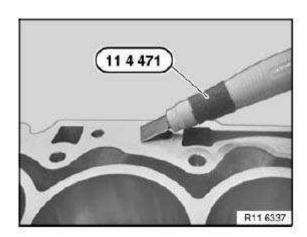


Fig. 47: Special Tool (11 4 471)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fine gasket remnants with special tool 11 4 472.

IMPORTANT: Do not use any metal-cutting tools.

There must not be any coolant, water or oil present in the pocket holes (risk of corrosion and cracking).

Clean all pocket holes.

 $Replace \ \underline{Cylinder \ Head \ Gasket} \ .$

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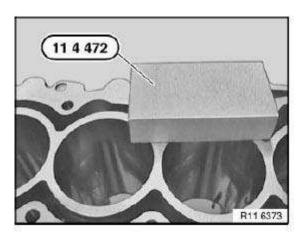


Fig. 48: Special Tool (11 4 472)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fit new cylinder head screws.

Do not wash off bolt coating.

Attach shims to cylinder head bolts.

Shims can drop into the engine (risk of damage!) .

Secure cylinder head bolts from inside outwards (1 to 10).

For tightening torque refer to 11 12 2AZ in 11 12 CYLINDER HEAD WITH COVER.

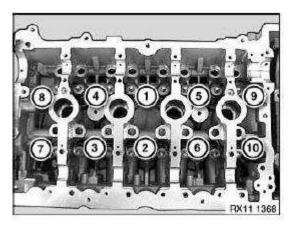
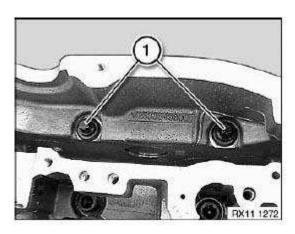


Fig. 49: Cylinder Head Bolts And Removal/Installation Sequence Courtesy of BMW OF NORTH AMERICA, INC.

Secure bolts (1).

For tightening torque refer to 11 12 1AZ in 11 12 CYLINDER HEAD WITH COVER.

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<u>Fig. 50: Timing Chain Mounting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Tighten the screw (1).

For tightening torque refer to 11 12 3AZ in 11 12 CYLINDER HEAD WITH COVER.

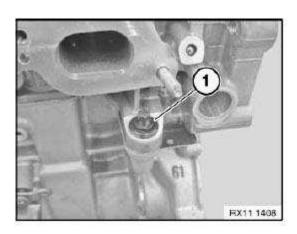


Fig. 51: Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N14)

Special tools required:

• 11 4 470

Necessary preliminary tasks:

• Remove Cylinder Head.

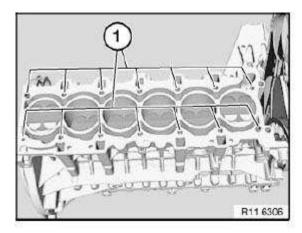
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Remove remnants of oil and dirt from pocket holes (1).

IMPORTANT: Work on sealing face on engine block and on cylinder head with special tool 11 4 470 only.

Do not use any metal-cutting tools.

NOTE: Illustration shows N52.



<u>Fig. 52: Cylinder Head Gasket Pocket Holes</u> Courtesy of BMW OF NORTH AMERICA, INC.

Identification (1) of head gasket (N14).

IMPORTANT: Rubber coating on cylinder head gasket must not be damaged under any circumstances.

If the cylinder head is remachined, a thicker coating + 0.3 mm is also available for service personnel.

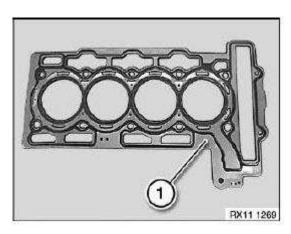
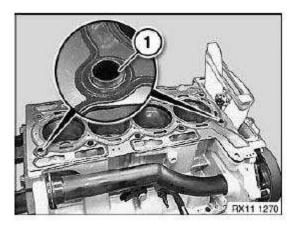


Fig. 53: Cylinder Head Gasket Courtesy of BMW OF NORTH AMERICA, INC.

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Check adapter sleeves (1) for damage and firm seating.

Lay cylinder head gasket on engine block.



<u>Fig. 54: Engine Block Adapter Sleeves</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for <u>Deviation From Flatness</u>.

Check cylinder head for Water Leaks .

Assemble engine.

11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N14)

Necessary preliminary tasks:

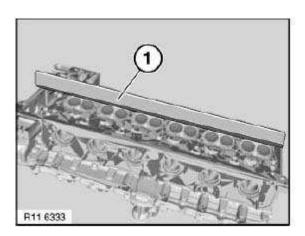
- Remove Cylinder Head .
- Remove exhaust camshaft.
- Remove **Inlet Camshaft**.

Check evenness of cylinder head sealing face with a standard straight-edge (1).

NOTE: Max. deviation from level (longitudinal) 0.10 mm

Illustration shows N52.

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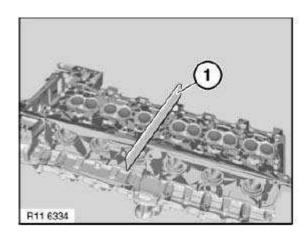


<u>Fig. 55: Standard Straight-Edge Longitudinally On Cylinder Head Sealing Faces</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check evenness of cylinder head sealing face with a standard straight-edge (1).

NOTE: Max. deviation from level (transversal) 0.05 mm

Illustration shows N52.



<u>Fig. 56: Standard Straight-Edge Transversely On Cylinder Head Sealing Faces</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for $\underline{Water\ Leaks}$.

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N14)

Special tools required:

- 11 9 521
- 11 9 522
- 11 9 523

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IMPORTANT: Pressure-test cylinder head to max. 3 bar .

Heat cylinder head to 60°.

Check for bubble formation in a water bath.

Necessary preliminary tasks:

- Remove **Cylinder Head** .
- Disassemble **Inlet** and **Exhaust** cylinder heads .

Mount special tool 11 9 521 with bolts 11 9 523.

Installation:

Install special tool 11 9 521 so that all water ducts are sealed.

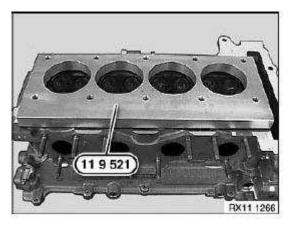
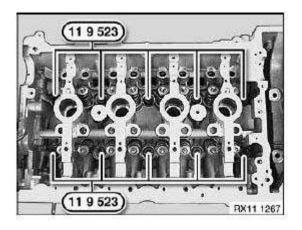


Fig. 57: Special Tool (11 9 521)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure bolts 11 9 523 to 25 Nm.



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Fig. 58: Special Tool (11 9 523)

Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 522 into place with existing screws (1 and 3) of coolant thermostat.

NOTE: Sealing flange 11 9 522 must rest flat.

Compressed air at valve (2) must not exceed 3 bar.

Heat cylinder head to 60°.

Check for bubble formation in a water bath.

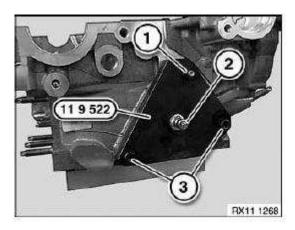


Fig. 59: Screws, Valve And Special Tool (11 9 522) Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

13 OIL SUMP

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N14)

Special tools required:

- 11 4 470
- 11 9 581
- 11 9 582

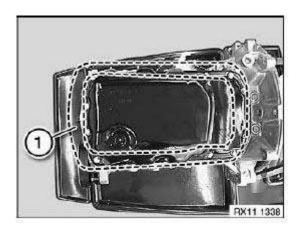
Necessary preliminary tasks:

• Drain Engine Oil .

Release oil sump bolts in area of line (1).

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For tightening torque refer to 11 13 2AZ in 11 13 OIL PAN.



<u>Fig. 60: Oil Sump Bolts Area</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) over exhaust manifold with special tools 11 9 582 and 11 9 581.

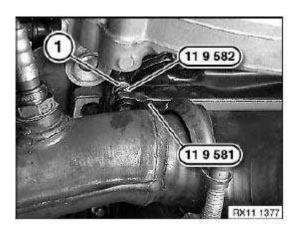


Fig. 61: Screw, Special Tool (11 9 581) And (11 9 582) Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing face (1) with special tool 11 4 470.

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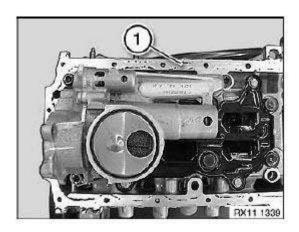


Fig. 62: Sealing Face Courtesy of BMW OF NORTH AMERICA, INC.

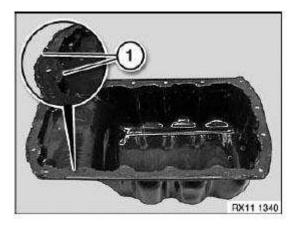
IMPORTANT: Do not use adhesive sealing bead.

Remove protruding or sticking-out sealing beads (1) with a sharp knife.

Installation:

Do not use liquid seal.

A metal substrate gasket is available for repairs.



<u>Fig. 63: Sealing Beads</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

14 HOUSING COVER

11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N14)

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Special tools required:

- 11 9 601
- 11 9 602
- 11 9 603

IMPORTANT: PTFE ring is supplied with a supporting ring.

Supporting ring is required as an installation tool; do not touch inner surface of PTFE ring with fingers (risk of damage!) .

Necessary preliminary tasks:

- Remove A/C line from compressor.
- Remove vibration damper.

IMPORTANT: Do not release central bolt.

If the central bolt is released, the sprocket wheels of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. The camshafts can warp in relation to the crankshaft (risk of damage!).

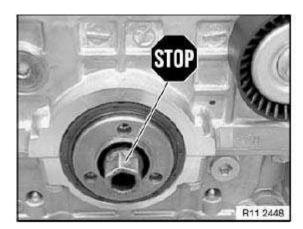


Fig. 64: Central Bolt Damage Warning Courtesy of BMW OF NORTH AMERICA, INC.

Drive PTFE ring inwards with a drift (1) until PTFE ring tilts outwards at bottom.

IMPORTANT: PTFE ring can slip inwards.

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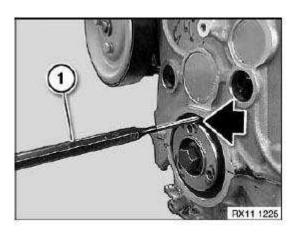


Fig. 65: Locating Drift
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 9 601 with screws (1) to crankshaft to 15 Nm.

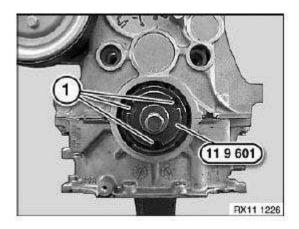


Fig. 66: Crankshaft Screws And Special Tool (11 9 601) Courtesy of BMW OF NORTH AMERICA, INC.

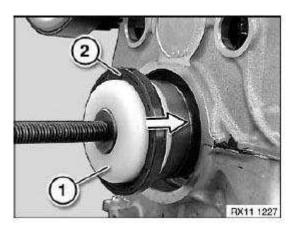
Installation:

Apply a light coating of oil to special tool 11 9 601.

Position PTFE ring (2) with supporting ring (1) on special tool $11\ 9\ 601$.

Push PTFE ring (2) over supporting ring (1) in direction of arrow up to crankcase.

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<u>Fig. 67: PTFE Ring, Supporting Ring And Installation Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove supporting ring from special tool 11 9 601.

NOTE: Supporting ring is no longer needed.

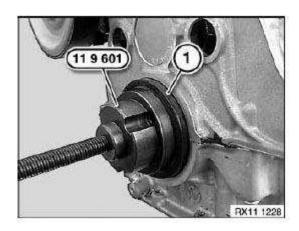


Fig. 68: Special Tool (11 9 601) Courtesy of BMW OF NORTH AMERICA, INC.

Draw in PTFE ring with special tool 11 9 602 in conjunction with special tool 11 9 603 until flush.

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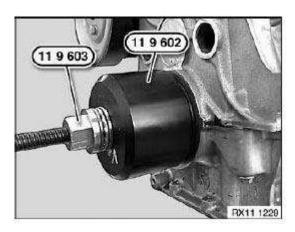


Fig. 69: Special Tool (11 9 602) And (11 9 603) Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (N14)

Special tools required:

- 11 9 611
- 11 9 612
- 11 9 613

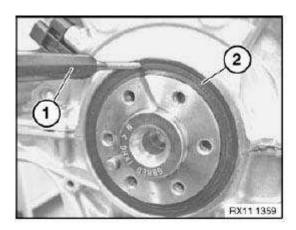
Necessary preliminary tasks:

- Remove **Transmission**.
- Remove Flywheel.

Brake off PTFE ring (2) with a drift (1).

IMPORTANT: Risk of damage to crankcase and to crankshaft!

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<u>Fig. 70: PTFE Ring And Drift</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 9 611 with supplied screws (1) to crankshaft.

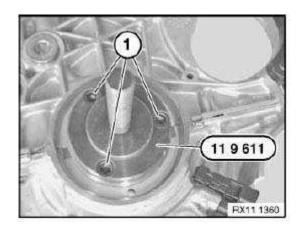
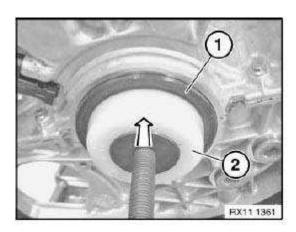


Fig. 71: Crankshaft Screws And Special Tool (11 9 611) Courtesy of BMW OF NORTH AMERICA, INC.

Position PTFE ring (1) with supporting ring (2) on special tool 11 9 611.

Push PTFE ring (1) in direction of arrow over supporting ring (2) onto crankshaft.

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<u>Fig. 72: PTFE Ring, Supporting Ring And Installation Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9 612.

Draw in PTFE ring with special tool 11 9 613.

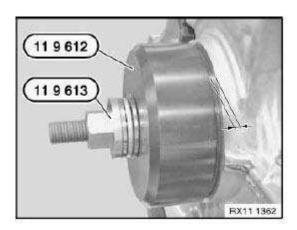


Fig. 73: Special Tool (11 9 612) And (11 9 613) Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 9 612 up to engine block.

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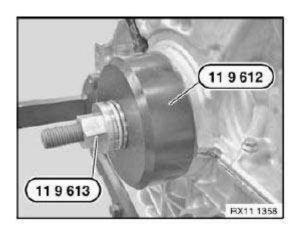


Fig. 74: Special Tool (11 9 612) And (11 9 613) Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

21 CRANKSHAFT WITH BEARING

11 21 500 REPLACING CRANKSHAFT (N14)

Special tools required:

- 00 9 120
- 11 4 471
- 11 4 472
- 11 6 251
- 11 6 252
- 23 1 240

WARNING: Rotating components (danger or injury!).

It is absolutely essential to follow the procedure described below and the instructions on handling the special tools

IMPORTANT: Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **Engine**.
- Mount engine on **Assembly Stand**.
- Remove Vibration Damper .

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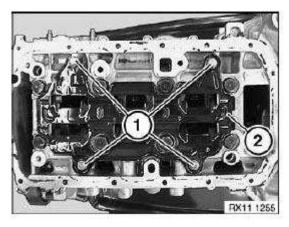
- Removing Oil Pan .
- Remove Oil Pump .
- Remove **Timing Chain**.
- Remove **Cylinder Head** .
- Remove Flywheel .

Release screws (1).

For tightening torque refer to 11 13 5AZ in 11 13 OIL PAN.

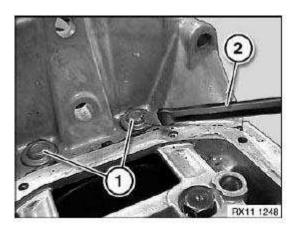
Remove oil deflector (2).

Remove all pistons.



<u>Fig. 75: Oil Deflector And Mounting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Drive out cover plates (1) with a cross-chisel (2).

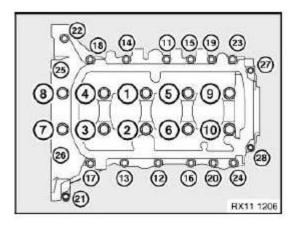


<u>Fig. 76: Cover Plates And Cross-Chisel</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Release screws (28 to 11).

Release screws (10 to 1).



<u>Fig. 77: Crankcase And Installation/Removal Sequence</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release crankcase lower half in direction of arrow with a regular screwdriver (2) and an open-end wrench (1).

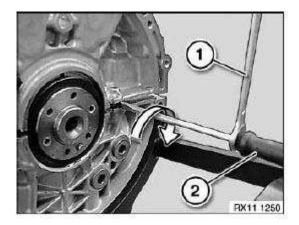


Fig. 78: Screwdriver, Open-End Wrench And Release Direction Courtesy of BMW OF NORTH AMERICA, INC.

Remove both radial shaft seals (1).

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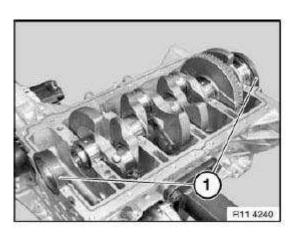


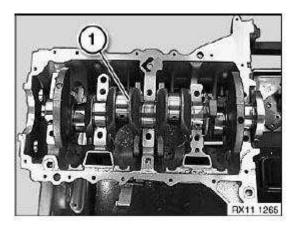
Fig. 79: Radial Shaft Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Remove crankshaft (1).

IMPORTANT: Remove crankshaft with aid of a second person.

Weight of crankshaft approx. 19 kg.

Remove main bearing shells, replace if necessary.



<u>Fig. 80: Crankshaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not clean sealing faces with a metal-cutting tool.

Clean sealing faces with special tools 11 4 471 and 11 4 472.

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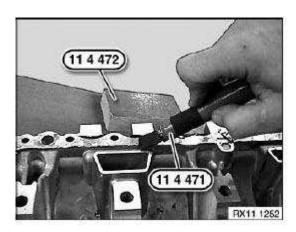


Fig. 81: Special Tool (11 4 471) And (11 4 472) Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (1) for damage and correct seating.

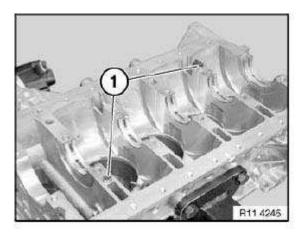


Fig. 82: Guide Sleeves Courtesy of BMW OF NORTH AMERICA, INC.

Apply sealing bead (1) to crankcase lower half (see Fig. 83) with Loctite 5970 sealing compound.

Installation:

Follow manufacturer's instructions (Loctite).

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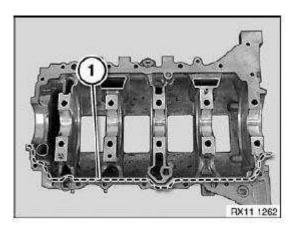


Fig. 83: Crankcase Lower Half Sealing Bead Application Area Courtesy of BMW OF NORTH AMERICA, INC.

Apply sealing bead (1) to crankcase upper half (see **Fig. 84**) with Loctite 5970 sealing compound.

Installation:

Follow manufacturer's instructions (Loctite).

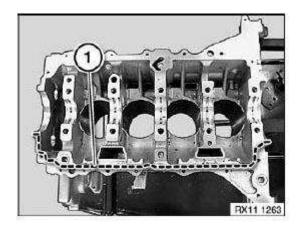


Fig. 84: Crankcase Upper Half Sealing Bead Application Area Courtesy of BMW OF NORTH AMERICA, INC.

Insert crankshaft (1).

IMPORTANT: Rotating component (danger of injury!)

Insert crankshaft with aid of a second person.

Weight of crankshaft approx. 19 kg.

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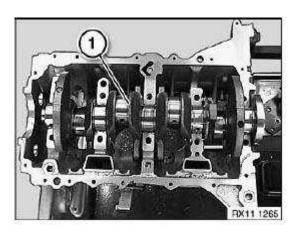
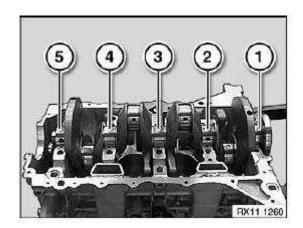


Fig. 85: Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate all bearings from 1 to 5 with engine oil.

Install crankcase lower half.



<u>Fig. 86: Crankshaft Bearings</u> Courtesy of BMW OF NORTH AMERICA, INC.

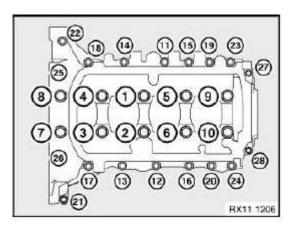
Tighten bolts (1 to 10).

For tightening torque refer to 11 11 1AZ in 11 11 ENGINE BLOCK.

Tighten bolts (11 to 28).

For tightening torque refer to 11 11 2AZ in 11 11 ENGINE BLOCK.

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<u>Fig. 87: Crankcase And Installation/Removal Sequence</u> Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bolts exclusively with special tool 00 9 120.

IMPORTANT: Jointing torque and angle of rotation must be observed without fail.

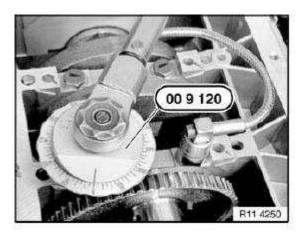


Fig. 88: Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a thin coating of Loctite 273 to cover sleeve (1) in area (2).

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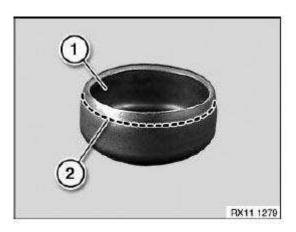
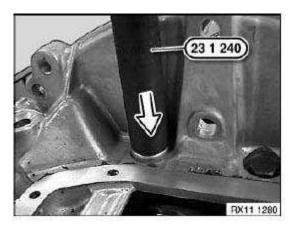


Fig. 89: Cover Sleeve And Loctite Coating Area Courtesy of BMW OF NORTH AMERICA, INC.

Drive cover sleeves firmly home with special tool 23 1 240.



<u>Fig. 90: Special Tool (23 1 240) And Installation Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Determine crankshaft axial clearance.

Attach special tool 11 6 252 with magnet.

Set special tool 11 6 251 to zero.

Press crankshaft in direction of rotation up to stop.

Refer to **ENGINE - TECHNICAL DATA -- N14 ENGINE**.

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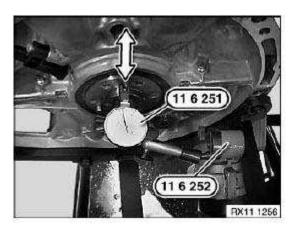


Fig. 91: Installation Direction, Special Tool (11 6 251) And (11 6 252) Courtesy of BMW OF NORTH AMERICA, INC.

Replace radial shaft seal at **Front**.

Replace radial shaft seal at **Rear**.

Assemble engine.

11 21 531 REPLACING ALL CRANKSHAFT MAIN BEARINGS (N14)

Special tools required:

• 11 4 470

IMPORTANT: Modified assignment of bearings.

Bearing (1) is at the output end (clutch end)

Determine main bearing colours; the designations on the crankcase and crankshaft are always required and can only determined using the table.

Necessary preliminary tasks:

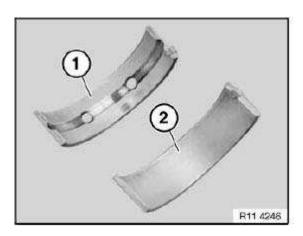
• Remove <u>Crankshaft</u>.

Installation:

Bearing shell (1) with lubricant groove must be fitted in crankcase upper section.

Bearing shell (2) without lubricant groove must be fitted in crankcase lower section (bedplate).

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<u>Fig. 92: Bearing Shells With And Without Lubricant Groove</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Modified assignment of bearings.

Bearing (1) is at the output end (clutch end)

Bearings (1 to 5).

Bearing (2) is a guide bearing.

IMPORTANT: Clean sealing surfaces.

Do not clean sealing faces with a metal-cutting tool.

Clean sealing faces with special tool 11 4 470 only.

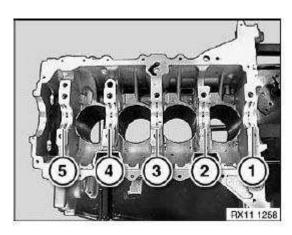


Fig. 93: Upper Crankcase Bearing Designations Courtesy of BMW OF NORTH AMERICA, INC.

Insert guide rings (1) in crankcase at bearing block (2) with groove facing outwards.

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If necessary, attach with engine oil to crankcase.

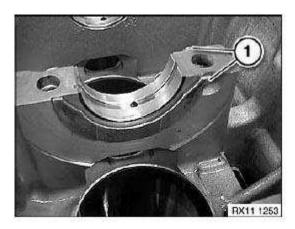


Fig. 94: Guide Rings And Installation Position Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Modified assignment of bearings.

Bearing (1) is at the output end (clutch end)

Bearings (1 to 5).

IMPORTANT: Clean sealing surfaces.

Do not clean sealing faces with a metal-cutting tool.

Clean sealing faces with special tool 11 4 470 only.

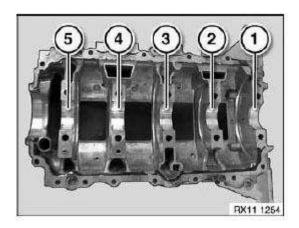


Fig. 95: Lower Crankcase Bearing Designations Courtesy of BMW OF NORTH AMERICA, INC.

Bearing classification on crankcase upper half:

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Bearing allocation 1-5: the designations on the crankcase and crankshaft are always required.

Refer to **COLOR CODE CHART** for the color code.

Example:

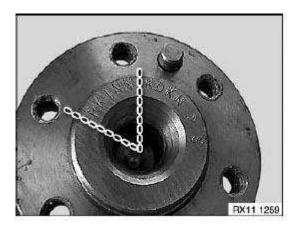
Bearing 1. Letter P

Bearing 2. Letter K

Bearing 3. Letter I

Bearing 4. Letter N

Bearing 5. Letter N



<u>Fig. 96: Bearing Identification Marks</u> Courtesy of BMW OF NORTH AMERICA, INC.

Bearing classification on crankcase upper half:

Bearing allocation 1-5: the designations on the crankcase and crankshaft are always required.

Refer to **BEARING COLOR CODE CHART: UPPER HALF** for the color code.

Example:

Bearing 1. Letter T

Bearing 2. Letter Q

Bearing 3. Letter Q

Bearing 4. Letter R

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Bearing 5. Letter R



Fig. 97: Bearing Color Code Courtesy of BMW OF NORTH AMERICA, INC.

BEARING COLOR CODE CHART: UPPER HALF

Table overview of bearing classification: upper half Identifying letter of crankshaft																		
D : 1.5			ъ	<u> </u>		1	. 	1	r of c						ъ		T	
Bearings 1-5	ı	A	В	C	D	Е	G	Н	1	K	M	N	P	Q	R	S	T	U
	Α	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Bl	Bl	Bl	Bl
	B	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Bl	Bl	Bl
	C	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Bl	Bl
	D	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Bl							
	E	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw							
	G	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw						
	Н	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw
	I	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw
	K	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw
Canalysess	M	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw
Crankcase	N	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw
	P	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Sw							
	Q	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr							
	R	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr						
	S	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr
	T	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr
	U	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr
	X	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr
	Y	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr
	Z	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Gr							

Crankshaft bearing colours:

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BL= Blue.

SW= Black.

Gr= Green.

Ge Yellow.

Or Orange.

Bearing classification on crankcase lower half:

Bearing allocation 1-5: the designations on the crankcase and crankshaft are always required.

Refer to **BEARING COLOR CODE CHART: LOWER HALF** for the color code.

Example:

Bearing 1. Letter P

Bearing 2. Letter K

Bearing 3. Letter I

Bearing 4. Letter N

Bearing 5. Letter N

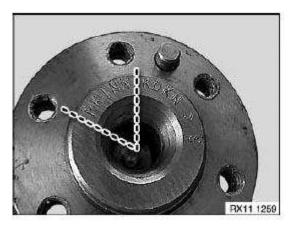


Fig. 98: Bearing Identification Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Bearing classification on crankcase lower half:

Bearing allocation 1-5: the designations on the crankcase and crankshaft are always required.

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Refer to **BEARING COLOR CODE CHART: LOWER HALF** for the color code.

Example:

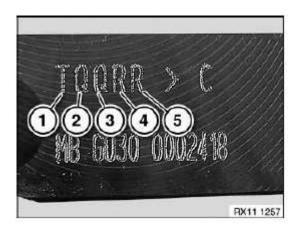
Bearing 1. Letter T

Bearing 2. Letter Q

Bearing 3. Letter Q

Bearing 4. Letter R

Bearing 5. Letter R



<u>Fig. 99: Bearing Color Code</u> Courtesy of BMW OF NORTH AMERICA, INC.

BEARING COLOR CODE CHART: LOWER HALF

Table everying of bearing alongification, lawer half																		
Table overview of bearing classification: lower half																		
Crankshaft																		
Bearings 1-5		A	В	C	D	E	G	Н	I	K	M	N	P	Q	R	S	T	U
	A	Gr	Sw	Bl														
	В	Gr	Gr	Sw	Bl													
	C	Gr	Gr	Gr	Sw	Bl	Bl	Bl	Bl	Bl	Bl							
	D	Gr	Gr	Gr	Gr	Sw	Bl	Bl	Bl	Bl	Bl							
	E	Gr	Gr	Gr	Gr	Gr	Sw	Bl	Bl	Bl	Bl							
Cuankaasa	G	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Bl	Bl	Bl							
Crankcase	Н	Gr	Sw	Bl	Bl													
	I	Gr	Sw	Bl														
	K	Ge	Gr	Sw														
	M	Ge	Ge	Gr	Sw													
	N	Ge	Ge	Ge	Gr	Sw	Sw	Sw	Sw	Sw	Sw							
l	P	Ge	Ge	Ge	Ge	Gr	Sw	Sw	Sw	Sw	Sw							

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| Q | Ge | Ge | Ge | Ge | Ge | Gr | Sw | Sw | Sw | Sw |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| R | Ge | Ge | Ge | Ge | Ge | Ge | Gr | Sw | Sw | Sw |
| S | Ge | Gr | Sw | Sw |
| T | Ge | Gr | Sw |
| U | Or | Ge | Gr |
| X | Or | Or | Ge | Gr |
| Y | Or | Or | Or | Ge | Gr | Gr | Gr | Gr | Gr | Gr |
| Z | Or | Or | Or | Or | Ge | Gr | Gr | Gr | Gr | Gr |

Crankshaft bearing colours:

BL= Blue.

SW= Black.

Gr= Green.

Ge Yellow.

Or Orange.

Example: Crankcase upper half:

Combining the dots of the designations of the crankshaft and crankcase produces the following color combinations.

Bearing 1: The letters (P and T) produce in the crankcase upper half the color Ge= Yellow with lubricant groove.

Bearing 2: K and Q= Ge= Yellow.

Bearing 3: I and Q= Ge= Yellow.

Bearing 4: N and R= Gr= Green.

Bearing 5: N and R= Gr= Green.

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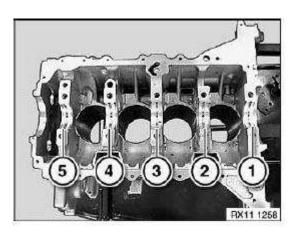


Fig. 100: Upper Crankcase Bearing Designations Courtesy of BMW OF NORTH AMERICA, INC.

Example: Crankcase lower half:

Combining the dots of the designations of the crankcase and crankshaft produces the following color combinations.

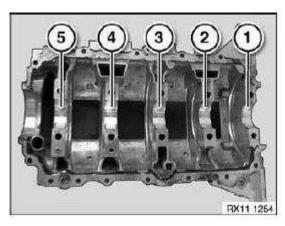
Bearing 1: The letters P. and T. produce in the crankcase lower half the color Gr= Green without lubricant groove.

Bearing 2: K and Q= Gr= Green.

Bearing 3: I and Q= Gr= Green.

Bearing 4: N and R= Gr= Green.

Bearing 5: N and R= Gr= Green.



<u>Fig. 101: Lower Crankcase Bearing Designations</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check spray nozzle (2) for damage, replace if necessary.

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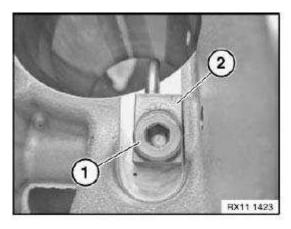
Release screw (1).

For tightening torque refer to 11 11 8AZ in 11 11 ENGINE BLOCK.

Remove oil spray nozzle (2).

Installation:

Oil spray nozzle (2) is turned when screw (1) is tightened and then rests with its upper corner against crankcase.



<u>Fig. 102: Oil Spray Nozzle And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Install Crankcase Lower Section .

Assemble engine.

22 FLYWHEEL

11 22 500 REMOVING AND INSTALLING OR REPLACING FLYWHEEL (N14)

Special tools required:

• 11 9 590

Necessary preliminary tasks:

- Remove Transmission .
- Remove Clutch .

Lock flywheel with special tool 11 9 590.

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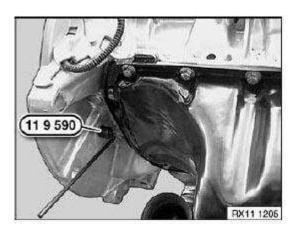


Fig. 103: Special Tool (11 9 590)
Courtesy of BMW OF NORTH AMERICA, INC.

Flywheel for automatic transmission.

Release flywheel bolts (1).

For tightening torque refer to 11 22 1AZ in 11 22 FLYWHEEL.

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Clean crankshaft thread for flywheel screws.

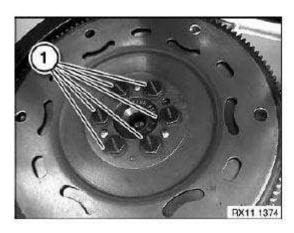


Fig. 104: Flywheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Flywheel for manual gearbox.

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Flywheel with and without dual-mass: release flywheel bolts (1).

For tightening torque refer to 11 22 2AZ in 11 22 FLYWHEEL.

Installation:

Flywheel is secured with a dowel pin.

Replace flywheel bolts (1).

Clean crankshaft thread for flywheel screws.

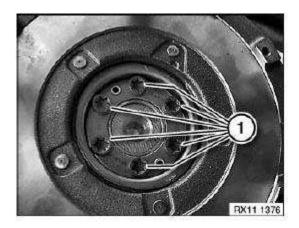


Fig. 105: Flywheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Sensor gear (1) is loose on crankshaft and is first secured to flywheel.

Dowel pin (2) for securing sensor gear/flywheel.

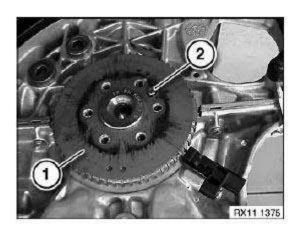


Fig. 106: Sensor Gear And Dowel Pin

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Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

23 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING OR REPLACING VIBRATION DAMPER (N14)

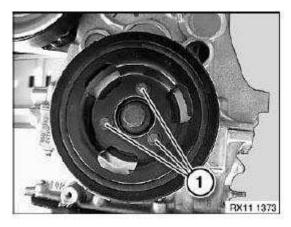
Necessary preliminary tasks:

- Remove right Wheel Arch Line .
- Remove Drive Belt.

Release screws (1).

For tightening torque refer to 11 23 1AZ in 11 23 VIBRATION DAMPER.

Remove vibration damper.



<u>Fig. 107: Vibration Damper Mounting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

24 CONNECTING ROD WITH BEARING

11 24 571 REPLACING CONROD BEARINGS (N14)

IMPORTANT: All crank pins are connected with the crankshaft.

Modified procedure; the bearing shell colours are the same at the top and bottom.

Necessary preliminary tasks:

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• Remove all **Pistons**.

Install new conrod bearing shells.

Insert conrod bearing shells (1 and 2).

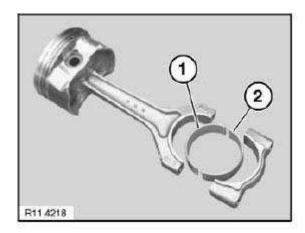


Fig. 108: Conrod Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

25 PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N14)

Special tools required:

- 00 9 120
- 11 9 620
- 11 9 670

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

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Necessary preliminary tasks:

- Remove **Engine**.
- Mount engine on **Assembly Stand**.
- Remove intake air manifold.
- Remove **Cylinder Head** .
- Remove **Engine Oil Sump**.
- Remove Oil Pump.

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Illustrations show N46.

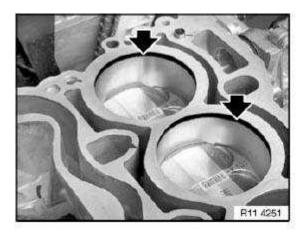


Fig. 109: Cylinder Wall

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example:

Direction of arrow (1) points to camshaft drive.

Cylinder allocation (2) per cylinder.

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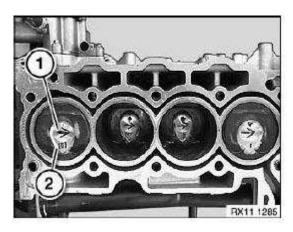


Fig. 110: Arrow Direction And Cylinder Allocation Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example:

Mark cylinder allocation (1) per cylinder.

Direction of arrow (2) points to camshaft drive.

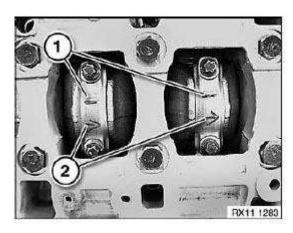


Fig. 111: Cylinder Allocation Mark And Arrow Direction Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

For tightening torque refer to 11 24 1AZ in 11 24 CONNECTING RODS AND BEARINGS.

Remove conrod bearing cap.

IMPORTANT: connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

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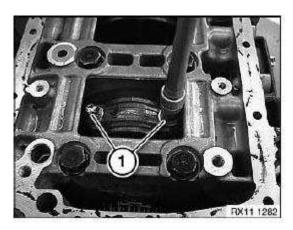


Fig. 112: Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to oil spray nozzle.

Attach special tool 11 9 620 in conrod big end.

Press out connecting rod and piston to cylinder head side.

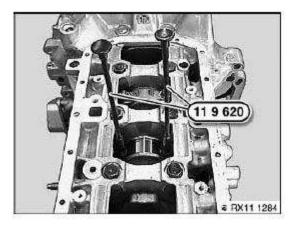


Fig. 113: Special Tool (11 9 620)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Protective goggles must be worn for the next work step.

WARNING: Protective goggles must be worn.

IMPORTANT: Piston and gudgeon pins are paired and must not be fitted individually.

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Lever out piston pin circlip with a screwdriver in direction of arrow.

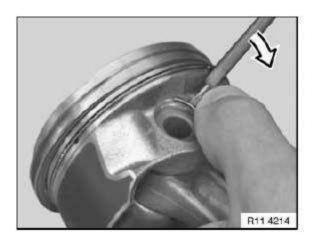
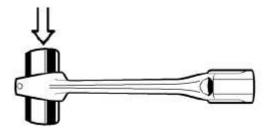


Fig. 114: Piston Pin Circlip And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

Installation:

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.



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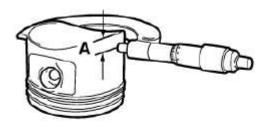
Fig. 115: Gudgeon Pin And Installation Direction Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point A from bottom edge of piston and offset at 90° to the axis of the gudgeon pin.

Piston diameter at measuring point A.

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88 11 051 U

<u>Fig. 116: Measuring Piston Diameter</u> Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, centre and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance.

If necessary, replace piston.

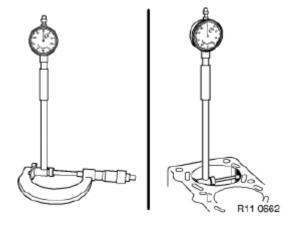


Fig. 117: Measuring Diameter Of Cylinder Bore Courtesy of BMW OF NORTH AMERICA, INC.

Install all Piston Rings .

Install all Bearing Shells.

Coat piston and piston rings with oil .

Pre-install piston in special tool 11 9 670.

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Screw special tool 11 9 620 into conrod.

Installation:

Check protective lugs on special tool 11 9 620 for correct position and damage.

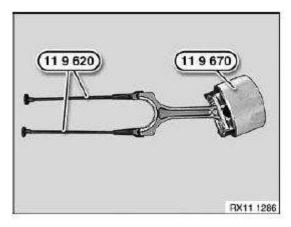


Fig. 118: Special Tools (11 9 620) And (11 9 670) Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston with connecting rod in cylinder.

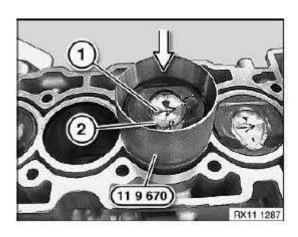
IMPORTANT: Danger of piston ring failure.

Press in piston with finger pressure only, do not drive in (see arrows in <u>Fig. 119</u>).

Insert piston (1) so that arrow on piston crown points to camshaft drive.

If reusing the pistons, assign cylinder allocation (2) to correct cylinder.

Press in piston with special tool 11 9 670.



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<u>Fig. 119: Cylinder Allocation, Piston, Special Tool (11 9 670) And Installation Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Point of fracture (1) on conrod.

Conrod and conrod bearing cap are identified with pairing letters (2) and must not be mixed up.

Mixing them up or incorrectly fitting the conrod bearing cap on the big end will result in engine damage.

Both pairing letters (2) must be together on one side.

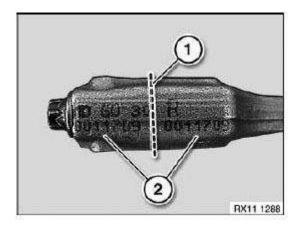


Fig. 120: Pairing Letters And Point Of Fracture Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crank pin.

Assemble connecting rod and crank pin.

Remove special tool 11 9 620.

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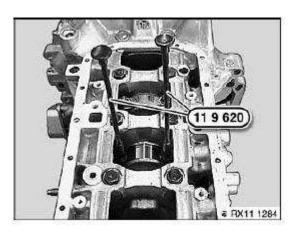
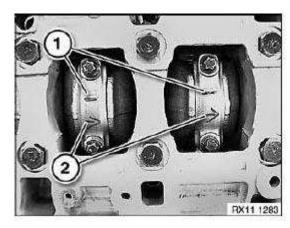


Fig. 121: Special Tool (11 9 620)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

Check cylinder identification markings (1).

Direction of arrow (2) points to camshaft drive.



<u>Fig. 122: Cylinder Allocation Markings And Bearing Caps</u> Courtesy of BMW OF NORTH AMERICA, INC.

Install new connecting rod bolts (1).

Carry out torsion angle tightening of conrods with special tool 00 9 120.

For tightening torque refer to 11 24 1AZ in 11 24 CONNECTING RODS AND BEARINGS

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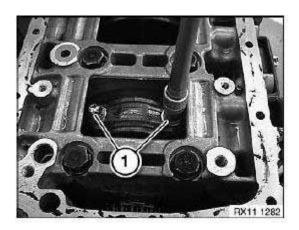


Fig. 123: Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N14)

Special tools required:

• 11 9 670

Necessary preliminary tasks:

• Remove all **Pistons** .

Measuring axial clearance of piston rings in piston ring groove.

ENGINE - TECHNICAL DATA -- N14 ENGINE

NOTE: It is not possible to measure the axial clearance of the oil scraper rings.

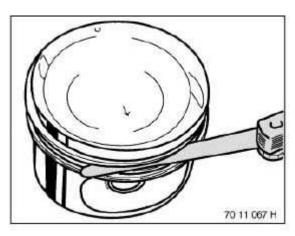


Fig. 124: Measuring Axial Clearance Of Piston Rings

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Courtesy of BMW OF NORTH AMERICA, INC.

Remove compression ring and stepped ring upwards with piston ring pliers.

Oil scraper ring comprises two steel band rings and a support spring.

NOTE: Oil scraper ring cannot be removed with piston ring pliers.

Put aside piston rings in correct sequence and installation position.

It might not be possible to find the identification on used piston rings.

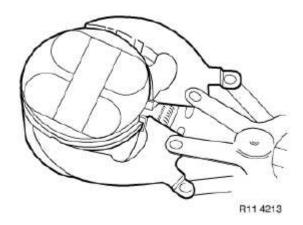
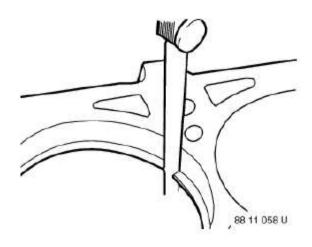


Fig. 125: Removing Compression Ring Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

New pistons may only be installed together with new piston rings.

Determine gap with a feeler gauge. See **ENGINE - TECHNICAL DATA -- N14 ENGINE**.



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Fig. 126: Measuring Piston Rings Gap Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Piston rings with "TOP" identification must point to piston crown.

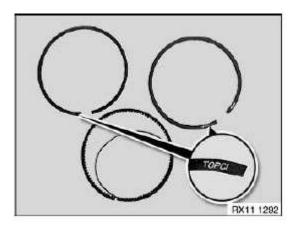


Fig. 127: Piston Rings With "Top" Identification Mark Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Piston rings with "TOP" identification must point to piston crown.

- 1. Plain compression ring
- 2. Taperface ring
- 3. Two-part oil scraper ring

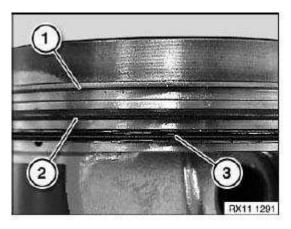


Fig. 128: Piston Rings Assembly And Components Courtesy of BMW OF NORTH AMERICA, INC.

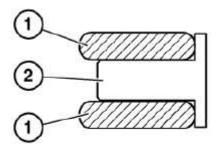
NOTE: Oil control ring comprises two steel band rings (1) and a support spring (2).

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Installation:

Insert support spring (2) into piston ring groove and then fit steel band rings (1) so that contact points are offset by approx.

120°.



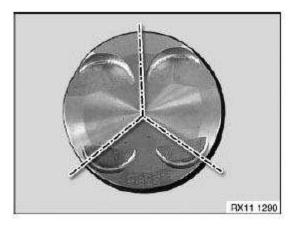
R11 2680

<u>Fig. 129: Support Spring, Steel Band Rings And Assembly Directions</u> Courtesy of BMW OF NORTH AMERICA, INC.

Offset the contact points (1) of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

Coat special tool 11 9 670 with sufficient engine oil. Risk of damage to piston rings!

NOTE: See <u>Fig. 130</u>.



<u>Fig. 130: Piston Ring Contact Points</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

28 V-RIBBED BELT WITH TENSIONER DEFLECT ELEMENT

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11 28 010 REPLACING ALTERNATOR DRIVE BELT (N14)

Necessary preliminary tasks:

- Remove Right Wheel Arch Cover
- Remove <u>Halogen</u> or <u>Xenon</u> right headlight
- Remove **Lock Bridge**

Bring belt tensioner (1) with wrench (2) into assembly position.

Secure assembly position of belt tensioner (1) by sliding locating pin (3) in direction of arrow.

WARNING: Danger of injury!

Remove wrench (1) again from belt tensioner.

Remove drive belt (4) from alternator.

NOTE: For reasons of clarity, illustration and text show front wall removed.

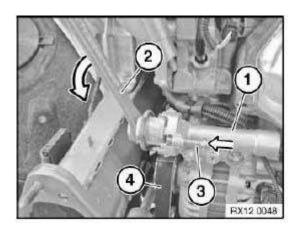


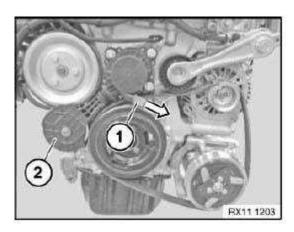
Fig. 131: Belt Tensioner, Wrench, Drive Belt, Locating Pin And Removal Directions Courtesy of BMW OF NORTH AMERICA, INC.

Move friction wheel (2) into servicing position.

In order to release the frictional connection between crankshaft and coolant pump, it is necessary to move the friction gear (2) into the servicing position.

Firmly pull handle (1) in direction of arrow until friction gear (2) is separated from belt pulley.

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<u>Fig. 132: Handle, Friction Gear And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

To secure friction gear in servicing position, suspend pull cable (1) on housing (2).

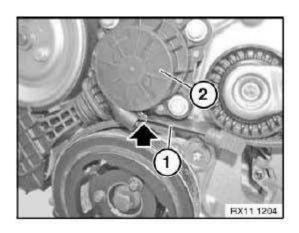


Fig. 133: Cable And Housing Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Check that drive belt for is in correct installation position - risk of damage .

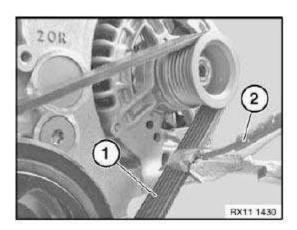
11 28 012 REPLACING DRIVE BELT (WITHOUT A/C SYSTEM)

Necessary preliminary tasks:

• Remove right Wheel Arch Line .

Cut through ribbed V-belt (1) with a suitable tool (2).

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<u>Fig. 134: Ribbed V-Belt And Suitable Tool</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position supplied tool (1) on vibration damper (see arrow in Fig. 135).

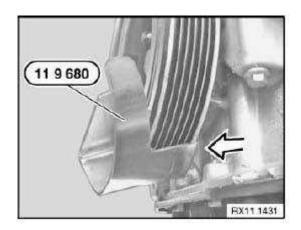
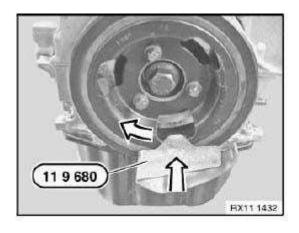


Fig. 135: Vibration Damper And Special Tool (11 9 680) Courtesy of BMW OF NORTH AMERICA, INC.

Attach installation tool in direction of arrow and slide further in direction of arrow.



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<u>Fig. 136: Special Tool (11 9 680) And Installation Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Bring installation tool (1) on vibration damper into installation position.

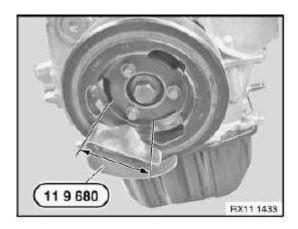
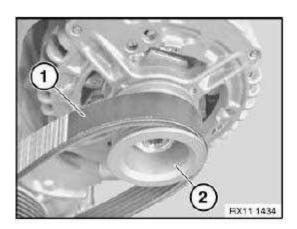


Fig. 137: Special Tool (11 9 680) And Installation Position Courtesy of BMW OF NORTH AMERICA, INC.

Place ribbed V-belt (1) on alternator (2).



<u>Fig. 138: Ribbed V-Belt And Alternator</u> Courtesy of BMW OF NORTH AMERICA, INC.

Place ribbed V-belt (1) in direction of arrow on vibration damper.

NOTE: See Fig. 139.

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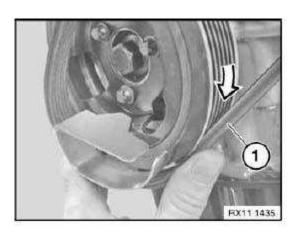
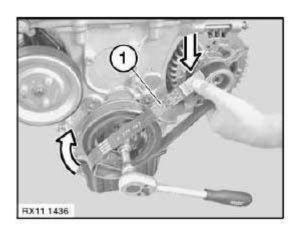


Fig. 139: Ribbed V-Belt And Installation Direction Courtesy of BMW OF NORTH AMERICA, INC.

Turn vibration damper in direction of arrow.

Press ribbed V-belt (1) inwards by hand or with a tyre iron (see arrow in Fig. 140).

IMPORTANT: Danger of injury!



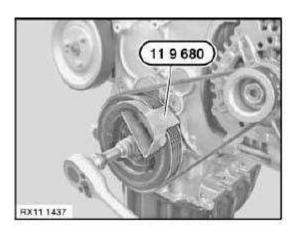
<u>Fig. 140: Ribbed V-Belt And Installation Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Turn vibration damper until ribbed V-belt is fully engaged.

Remove installation tool (1) from vibration damper.

NOTE: Installation tool is no longer needed.

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<u>Fig. 141: Special Tool (11 9 680)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N14)

WARNING: Tensioning device subject to spring bias (danger of injury!) .

Necessary preliminary tasks:

- Bring **Front Panel** into service position.
- Disconnect lambda oxygen sensor cable.

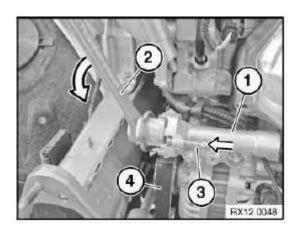
Pretension tensioning device (1) with tool (2) in direction of arrow.

Press in locking pin (3) in direction of arrow and hold.

Release tool (2) slowly and secure locking pin (3) in position.

NOTE: Locking pin (3) holds tensioning device (1) at pretension.

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<u>Fig. 142: Belt Tensioner, Wrench, Drive Belt, Locating Pin And Removal Directions</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2).

For tightening torque refer to 11 28 1AZ in <u>11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION</u> **ELEMENT**.

Remove tensioner (3).

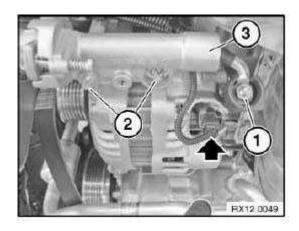


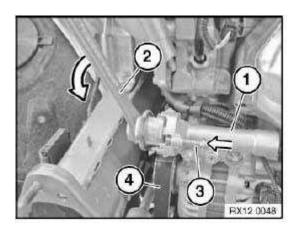
Fig. 143: Tensioner And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lever tensioning device (1) with tool (2) in direction of arrow.

Locking pin (3) is pretensioned with a spring and is automatically relieved during unlocking.

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<u>Fig. 144: Belt Tensioner, Wrench, Drive Belt And Installation Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 28 035 REMOVING AND INSTALLING/REPLACING FRICTION GEAR (N14)

Special tools required:

- 11 9 581
- 11 9 583

Necessary preliminary tasks:

• Remove Right Wheel Arch Cover

Pull out friction gear with mechanical release (3) in direction of arrow and lock on locking hook.

Friction gear (1) lifts mechanically off belt drive.

Disconnect plug connection (2) on friction gear.

NOTE: Picture shows friction gear removed.

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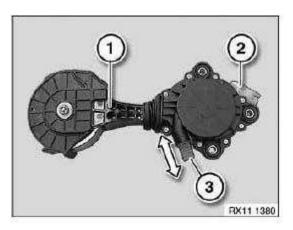


Fig. 145: Plug Connection, Friction Gear, Mechanical Release And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

Move friction wheel (2) into servicing position.

To secure friction gear in servicing position, suspend pull cable (1) on housing (2).

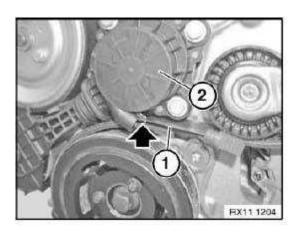


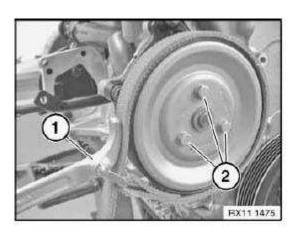
Fig. 146: Cable And Housing Courtesy of BMW OF NORTH AMERICA, INC.

Secure belt pulley of water pump with an oil filter band (1).

Release bolts (2) with special tools 11 9 581 and 11 9 583.

For tightening torque refer to 11 51 2AZ in $\underline{\textbf{11 51 WATER PUMP AND DRIVE}}$.

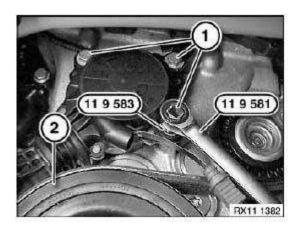
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<u>Fig. 147: Oil Filter Band And Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) with special tools 11 9 583 and 11 9 581.

NOTE: Drive belt does not have to be removed.

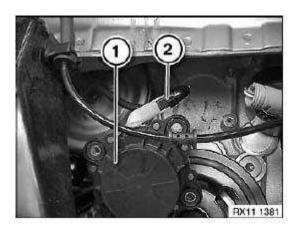


<u>Fig. 148: Bolts, Special Tools (11 9 583) And (11 9 581)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove friction gear (1) towards bottom.

Disconnect plug connection (2).

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<u>Fig. 149: Friction Gear And Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Check cable routing for correct installation position (risk of damage!).

31 CAMSHAFT

11 31 005 CHECKING CAMSHAFT TIMING (N14)

Special tools required:

- 11 9 522
- 11 9 551
- 11 9 590

IMPORTANT: Modified procedure for timing.

The timing is not determined at firing TDC of cylinder no. 1.

All pistons are in the 90° position.

Check locking of adjustment unit.

Necessary preliminary tasks:

• Remove Cylinder Head Cover .

IMPORTANT: Danger of mixing up special tool bore.

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Balance hole and special tool bore can be mixed up; all pistons must be in the 90° position.

If necessary, determine by means of spark plug bore.

Rotate crankshaft at central bolt.

Position crankshaft with special tool 11 9 590.

Do not remove special tool 11 9 590 during repair work.

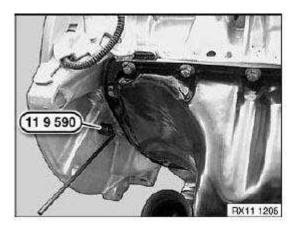


Fig. 150: Special Tool (11 9 590)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check locking on VANOS adjustment unit.

Attempt to rotate camshaft in direction of rotation at hexagon head.

The adjustment unit is locked in the initial position when the camshaft is non-positively connected to the adjustment unit.

The adjustment unit is faulty if no fixed connection to the camshaft is established.

Both camshafts are in the correct installation position when the designation (IN) for inlet camshaft points upwards.

In the case of the exhaust camshaft, the designation (EX) must point upwards.

NOTE: Pictures show N12.

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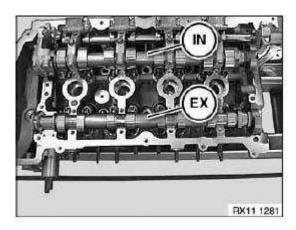


Fig. 151: Inlet And Exhaust Camshaft Designations Courtesy of BMW OF NORTH AMERICA, INC.

Position of inlet camshaft (1) points at an angle to the right in an upper inward direction.

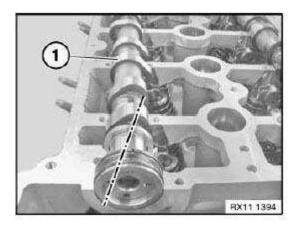
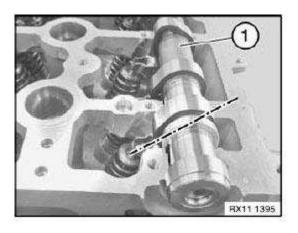


Fig. 152: Inlet Camshaft And Timing Position Courtesy of BMW OF NORTH AMERICA, INC.

Position of exhaust camshaft (1) points at an angle to the right in an upper inward direction.



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Fig. 153: Exhaust Camshaft And Timing Position Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 551 (exhaust) on twin surface of exhaust camshaft and secure with a screw (1).

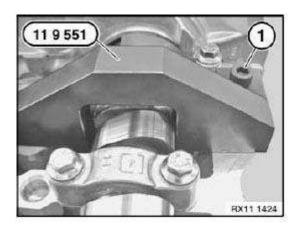


Fig. 154: Special Tool (11 9 551) And Screw Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 11 9 522 on cylinder head.

Position special tool 11 9 551 (inlet) on twin surface of inlet camshaft and secure with two screws.

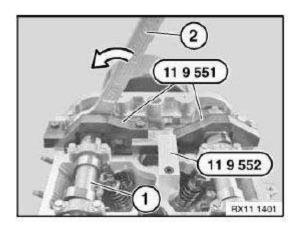


Fig. 155: Special Tool (11 9 522) And (11 9 551) Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust **Valve Timing**.

11 31 025 REMOVING AND INSTALLING/REPLACING INLET CAMSHAFT (N14)

Special tools required:

11 4 480

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- 11 9 000
- 11 9 551
- 11 9 552
- 11 9 661
- 11 9 662

IMPORTANT: It is absolutely essential to follow an exact procedure for removing and installing the inlet camshaft.

In order to avoid incorrect timing adjustment, it is essential to check the locking of the adjustment unit and if necessary perform locking by rotating the camshaft.

Necessary preliminary tasks:

- Remove **Cylinder Head Cover** .
- Check **Timing**.
- Remove Chain Tensioner .

To release central bolts, always use special tool 11 9 551 of exhaust camshaft.

Position special tool 11 9 551 on twin surface of exhaust camshaft.

Secure special tool 11 9 551 with a screw (1).

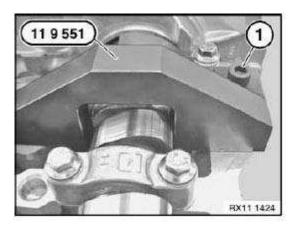


Fig. 156: Special Tool (11 9 551) And Screw Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check function of adjustment unit locking by rotating camshaft.

Mount special tool 11 9 551 on inlet and exhaust camshafts.

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Screw in special tool 11 9 552 on cylinder head with a screw.

To release central bolts, always use special tool 11 9 551.

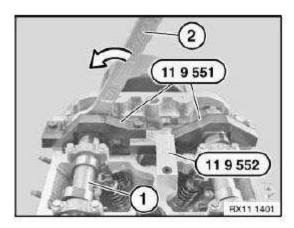
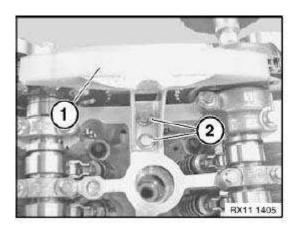


Fig. 157: Special Tool (11 9 522) And (11 9 551) Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2).

Remove clamping rail (1).



<u>Fig. 158: Clamping Rail And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

For tightening torque refer to 11 11 3AZ in 11 11 ENGINE BLOCK.

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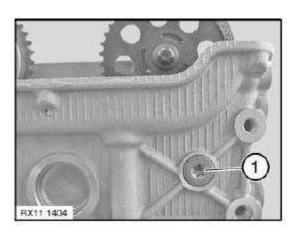
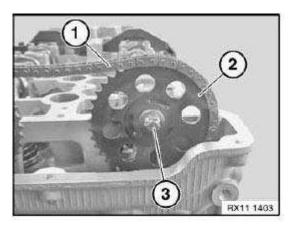


Fig. 159: Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt (3).

For tightening torque refer to 11 36 2AZ in 11 36 VARIABLE CAMSHAFT CONTROL.

Feed out sprocket wheel (2) from timing chain (1) towards front.



<u>Fig. 160: Central Bolt, Sprocket Wheel And Timing Chain</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt (3).

For tightening torque refer to 11 36 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL.

Set down VANOS adjustment unit on special tool 11 4 480.

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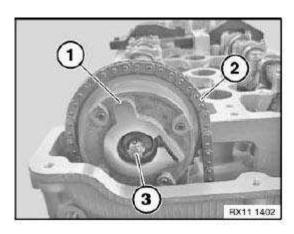


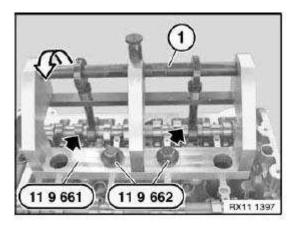
Fig. 161: Central Bolt And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removed cylinder head:

When using special tool 11 9 000, it will be necessary to remove the aluminium profile insert.

Screw special tool 11 9 661 with special tools 11 9 662 into spark plug holes.

Turn eccentric shaft (1) in direction of ring and lock.



<u>Fig. 162: Eccentric Shaft, Removal Direction, Special Tool (11 9 661) And (11 9 662)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws on bearing caps (1).

For tightening torque refer to 11 12 6AZ in 11 12 CYLINDER HEAD WITH COVER.

Bearing cap (2) is a thrust bearing and has the number (5).

All bearing caps (1) are identified with numbers from (6 to 9).

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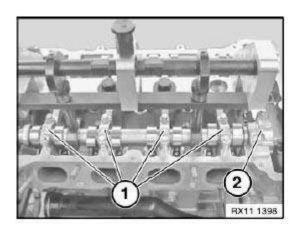
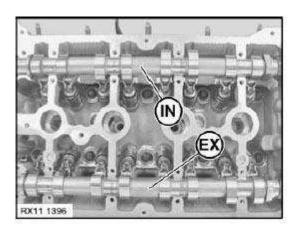


Fig. 163: Bearing Caps Courtesy of BMW OF NORTH AMERICA, INC.

Inlet camshaft is identified with designation (IN).

Insert inlet camshaft so that designation (IN) can be read from above.



<u>Fig. 164: Inlet And Exhaust Camshaft Designations</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position inlet camshaft (1) so that cam of inlet camshaft (1) points upward at an angle.

Installation:

Lubricate all bearing points with engine oil.

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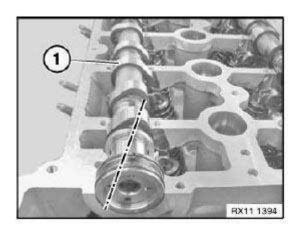


Fig. 165: Inlet Camshaft And Positioning Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Adjust Valve Timing .

11 31 028 REMOVING AND INSTALLING/REPLACING EXHAUST CAMSHAFT (N14)

Special tools required:

- 11 9 000
- 11 9 551
- 11 9 552
- 11 9 661
- 11 9 662

IMPORTANT: It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.

Necessary preliminary tasks:

- Remove cylinder head cover.
- Check timing.
- Remove Chain Tensioner .

To release central bolts, always use special tool 11 9 551 of exhaust camshaft.

Position special tool 11 9 551 on twin surface of exhaust camshaft.

Secure special tool 11 9 551 with a screw (1).

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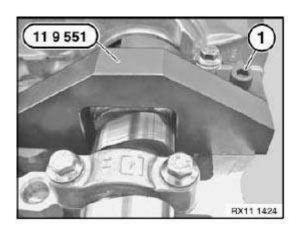


Fig. 166: Special Tool (11 9 551) And Screw Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check function of adjustment unit locking by rotating camshaft.

Mount special tool 11 9 551 on inlet and exhaust camshafts.

Screw in special tool 11 9 552 on cylinder head with a screw.

To release central bolts, always use special tool 11 9 551.

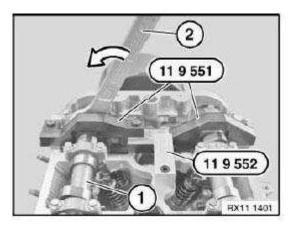


Fig. 167: Special Tool (11 9 522) And (11 9 551) Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2).

Remove clamping rail (1).

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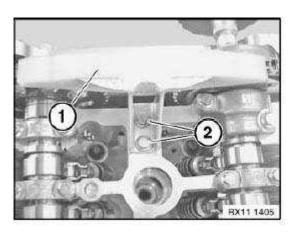
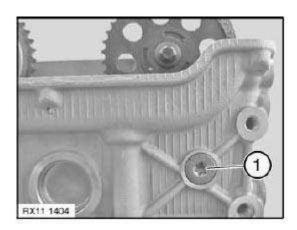


Fig. 168: Clamping Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

For tightening torque refer to 11 11 3AZ in 11 11 ENGINE BLOCK.



<u>Fig. 169: Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt (3).

For tightening torque refer to 11 36 2AZ in $\underline{\textbf{11 36 VARIABLE CAMSHAFT CONTROL}}$.

Feed out sprocket wheel (2) from timing chain (1) towards front.

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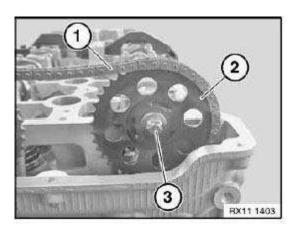


Fig. 170: Central Bolt, Sprocket Wheel And Timing Chain Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not remove VANOS adjustment unit.

Release central bolt (3).

For tightening torque refer to 11 36 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL.

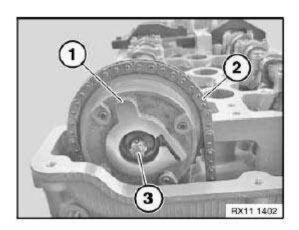


Fig. 171: Central Bolt And Timing Chain Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removed cylinder head:

When using special tool 11 9 000, it will be necessary to remove the aluminium

profile insert.

Screw special tool 11 9 661 with special tools 11 9 662 into spark plug holes.

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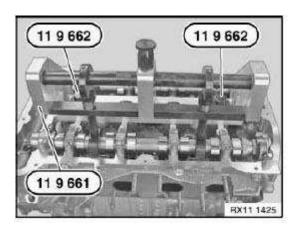


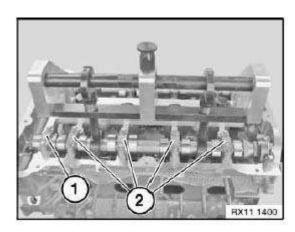
Fig. 172: Special Tools (11 9 661) And (11 9 662) Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws on bearing caps (1 and 2).

For tightening torque refer to 11 12 7AZ in 11 12 CYLINDER HEAD WITH COVER.

Bearing cap (1) is a thrust bearing and has the number (0).

All bearing caps (2) are identified with numbers from (1 to 4).



<u>Fig. 173: Camshaft Bearing Caps</u> Courtesy of BMW OF NORTH AMERICA, INC.

Exhaust camshaft is identified with designation (EX).

Insert exhaust camshaft so that designation (EX) can be read from above.

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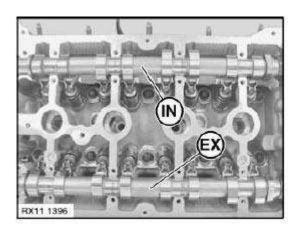


Fig. 174: Inlet And Exhaust Camshaft Designations Courtesy of BMW OF NORTH AMERICA, INC.

Position exhaust camshaft (1) so that cam of exhaust camshaft (1) points inward at an angle.

Installation:

Lubricate all bearing points with engine oil.

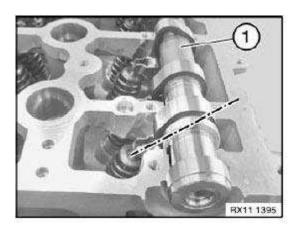


Fig. 175: Exhaust Camshaft And Installation Position Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Adjust Valve Timing.

11 31 051 REPLACING TIMING CHAIN (N14)

Special tools required:

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- 00 9 120
- 11 9 280
- 11 9 550
- 11 9 590

IMPORTANT: Modified procedure for timing adjustment.

The timing is not determined at firing TDC of cylinder no. 1.

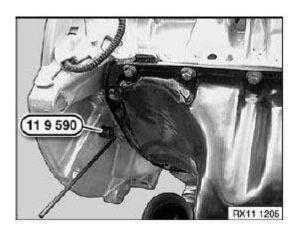
All pistons are in the 90° position.

Necessary preliminary tasks:

- Remove **Cylinder Head Cover** .
- Remove all spark plugs.
- Remove Vibration Damper.
- Remove Chain Tensioner .
- Remove **VANOS Adjustment Unit**.
- Remove sprocket wheel for exhaust camshaft.
- Remove **PTFE Ring** at front.
- Remove **Belt Tensioner** .

Position crankshaft with special tool 11 9 590.

Do not remove special tool 11 9 590 during repair work.



<u>Fig. 176: Special Tool (11 9 590)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Do not remove special tool 11 9 550.

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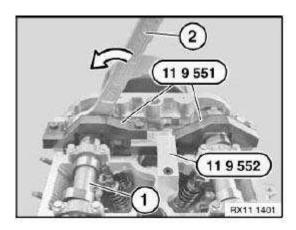


Fig. 177: Special Tool (11 9 522) And (11 9 551) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Employ a second person for gripping when releasing central bolt (1).

Fit special tool 11 9 280 on hub for vibration damper with screws (2).

Release central bolt (1).

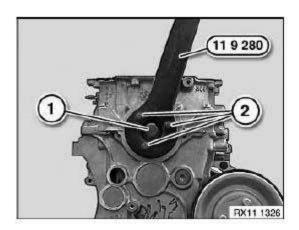
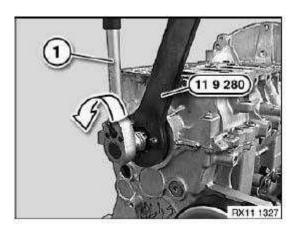


Fig. 178: Screws, Central Bolt And Special Tool (11 9 280) Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt in direction of arrow.

For tightening torque refer to 11 21 1AZ in <u>11 21 CRANKSHAFT AND BEARINGS</u>.

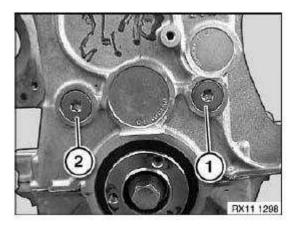
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<u>Fig. 179: Special Tool (11 9 280) And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pins (1 and 2).

For tightening torque refer to 11 31 6AZ in 11 31 CAMSHAFT



<u>Fig. 180: Bearing Pins</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove hub (3) towards front.

Remove chain module with timing chain.

Using a hook (2), pull oil pump chain (1) upwards.

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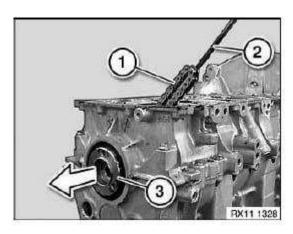


Fig. 181: Hook, Oil Pump Chain, Hub And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

Sprocket wheel (1) of timing chain.

Sprocket wheel (2) of oil pump.

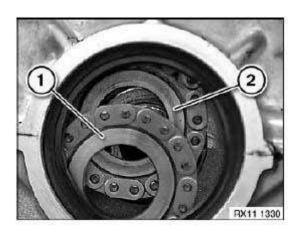


Fig. 182: Timing Chain Sprocket Wheel And Oil Pump Sprocket Wheel Courtesy of BMW OF NORTH AMERICA, INC.

Secure chain module (1) with rubber (3) to facilitate assembly.

Pull timing chain (2) upwards until sprocket wheel (4) rests against chain guide (1).

Install timing chain (2) and sprocket wheel (4) in this position.

Installation:

Always keep timing chain (2) tensioned; it is possible for timing chain (2) to jam on chain module (1).

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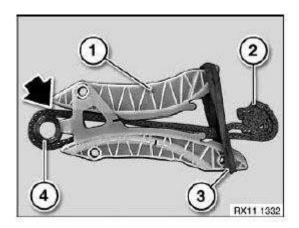


Fig. 183: Chain Module, Rubber, Timing Chain And Sprocket Wheel Courtesy of BMW OF NORTH AMERICA, INC.

Installation position of both sprocket wheels.

Sprocket wheel (1) of oil pump.

Guide rail (2) of timing chain.

Hub (3) on crankshaft.

Sprocket wheel (4) of timing chain.

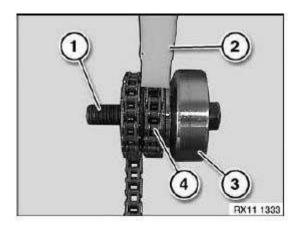


Fig. 184: Sprocket Wheels, Guide Rail And Hub Courtesy of BMW OF NORTH AMERICA, INC.

Attach oil pump sprocket wheel (2) in direction of arrow to crankshaft (1).

Insert chain module with timing chain and secure.

Attach crankshaft hub.

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Screw in central bolt.

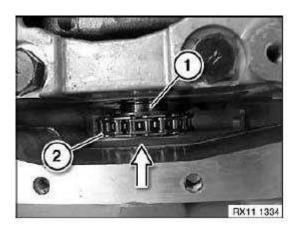


Fig. 185: Oil Pump Sprocket Wheel, Central Bolt And Crankshaft Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 280 from hub.

Secure central bolt with special tool 00 9 120.

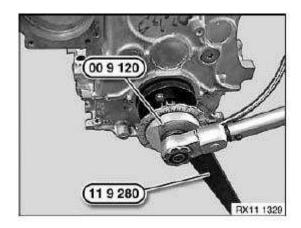


Fig. 186: Special Tool (11 9 280) And (00 9 120) Courtesy of BMW OF NORTH AMERICA, INC.

Install **VANOS Adjustment Unit**.

Install sprocket wheel for exhaust camshaft.

Crank engine twice.

Check **Timing**.

Install PTFE Ring.

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Assemble engine.

11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N14)

Release chain tensioner (1).

For tightening torque refer to 11 31 4AZ in 11 31 CAMSHAFT.

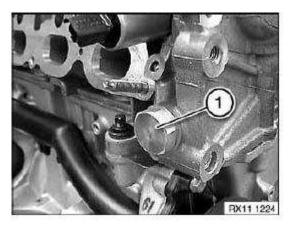
IMPORTANT: Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.

Make sure no oil runs onto the belt drive.

Installation:

No sealing ring is fitted during series-production assembly.

A sealing ring must be fitted by service personnel when the chain tensioner is fitted.



<u>Fig. 187: Chain Tensioner</u> Courtesy of BMW OF NORTH AMERICA, INC.

If the chain tensioner is reused, its oil chamber must be drained. Place chain tensioner on a level working surface and slowly compress.

Repeat procedure twice.

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Fig. 188: Chain Tensioner Compression Direction Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 505 ADJUSTING CAMSHAFT TIMING (N14)

Special tools required:

- 00 9 120
- 00 9 250
- 11 9 340
- 11 9 551
- 11 9 590

IMPORTANT: Modified procedure for timing adjustment.

The timing is not determined at firing TDC of cylinder no. 1.

All pistons are in the 90° position.

Check locking of adjustment units.

To open the central bolt at the camshaft, grip hexagon on rear of camshaft.

Risk of damage!

Necessary preliminary tasks:

• Remove Cylinder Head Cover.

IMPORTANT: Danger of mixing up special tool bore.

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Balance hole and special tool bore can be mixed up; all pistons must be in the 90° position.

If necessary, determine by means of spark plug bore.

Rotate crankshaft at central bolt.

Slide in special tool 11 9 590 in direction of arrow and block crankshaft.

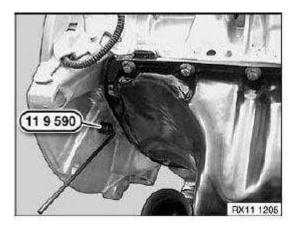


Fig. 189: Special Tool (11 9 590)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to chain drive.

To open central bolt, mount special tool 11 9 551 on camshaft.

If the setting gauges cannot be positioned, grip the camshaft with an open-end wrench to release the central bolt.

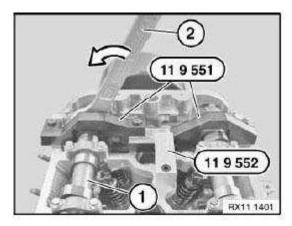


Fig. 190: Special Tool (11 9 522) And (11 9 551) Courtesy of BMW OF NORTH AMERICA, INC.

Release chain tensioner (have a cleaning cloth ready).

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For tightening torque refer to 11 31 4AZ in 11 31 CAMSHAFT.

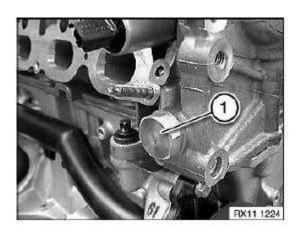
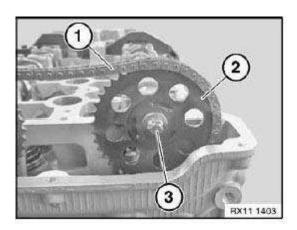


Fig. 191: Chain Tensioner Courtesy of BMW OF NORTH AMERICA, INC.

To open central bolts (3), mount special tool 11 9 551 on camshafts.

Release central bolts (3).

For tightening torque refer to 11 36 2AZ in 11 36 VARIABLE CAMSHAFT CONTROL.



<u>Fig. 192: Central Bolt, Sprocket Wheel And Timing Chain</u> Courtesy of BMW OF NORTH AMERICA, INC.

To open central bolts (3), mount special tool 11 9 551 on camshafts.

Release central bolts (3).

For tightening torque refer to 11 36 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL.

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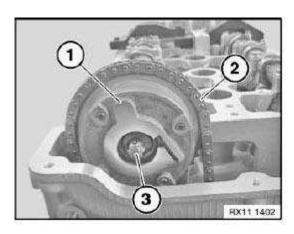


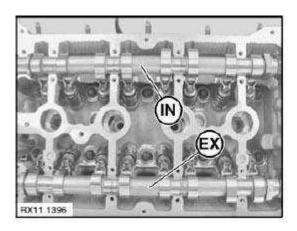
Fig. 193: Central Bolt And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

The designations for the inlet camshaft (IN) and exhaust camshaft (EX) point upwards.

Both camshafts (inlet and exhaust) have three machined surfaces to enable special tool 11 9 551 to be mounted.

The fourth surface is not machined and is crescent-shaped - it must point downwards.

NOTE: Picture shows N12



<u>Fig. 194: Inlet And Exhaust Camshaft Designations</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position of exhaust camshaft (1) points at an angle to the right in a lower inward direction.

NOTE: Picture shows sprocket wheel removed.

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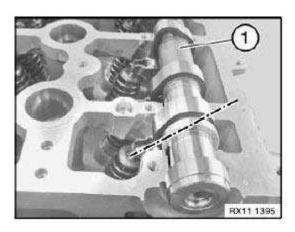
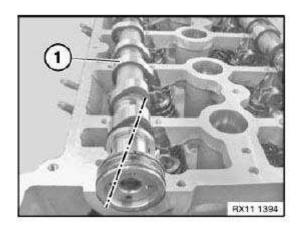


Fig. 195: Exhaust Camshaft And Timing Position Courtesy of BMW OF NORTH AMERICA, INC.

Position of inlet camshaft (1) points at an angle to the left in an upper inward direction.

NOTE: Picture shows VANOS adjustment unit removed.

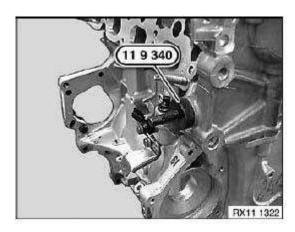


<u>Fig. 196: Inlet Camshaft And Timing Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 340 into cylinder head.

Pretension timing chain with special tool 00 9 250 to **0.6 Nm.**

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<u>Fig. 197: Chain Module, Rubber, Timing Chain And Sprocket Wheel</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) with special tool 00 9 120 or an electronic torque wrench.

For tightening torque refer to 11 36 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL.

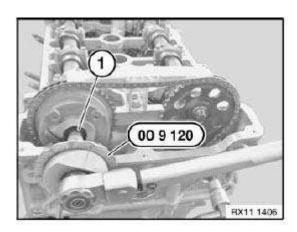


Fig. 198: Central Bolt And Special Tool (00 9 120) Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) with special tool 00 9 120 or an electronic torque wrench.

For tightening torque refer to 11 36 2AZ in $\underline{\textbf{11 36 VARIABLE CAMSHAFT CONTROL}}$.

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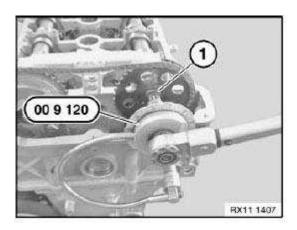


Fig. 199: Central Bolt And Special Tool (00 9 120) Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

33 ROCKER ARM WITH BEARING MOUNT

11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N14)

Special tools required:

• 11 4 480

IMPORTANT: Rocker arms (1) are divided into bearing categories.

The tolerance classes are identified in numbers from 1 to 6.

Already used roller cam followers (1) may only be reused in the same position.

A classification is not necessary in the N14 engine; in the event of replacement, all numbers from 1 to 6 can alternatively be installed.

Necessary preliminary tasks:

- Remove Cylinder Head Cover. .
- Remove Inlet Camshaft.
- Remove Exhaust Camshaft.

IMPORTANT: Already used roller cam followers (1) may only be reused in the same position.

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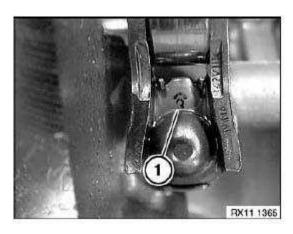


Fig. 200: Roller Cam Followers
Courtesy of BMW OF NORTH AMERICA, INC.

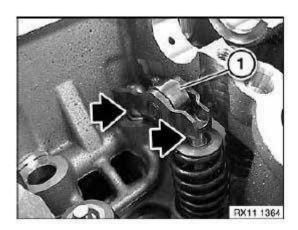
IMPORTANT: Already used roller cam followers (1) may only be reused in the same position.

Detach roller cam followers (1) from HVCA element and remove.

Place roller cam followers (1) in neat order in special tool 11 4 480.

Installation:

Before installing camshafts, make sure roller cam followers are correctly seated (see arrow in Fig. 201).



<u>Fig. 201: Roller Cam Followers</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

34 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N14)

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Special tools required:

• 11 4 480

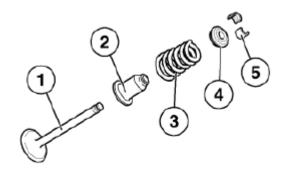
Necessary preliminary tasks:

- Remove Cylinder Head .
- Remove Inlet Camshaft.
- Remove Exhaust Camshaft.
- Remove Roller Cam Follower.
- Remove **Valve Springs** .
- Remove Valve Stem Seals.

Arrangement:

- 1. Valve
- 2. Valve stem seal with spring plate, bottom
- 3. Valve spring
- 4. Top plate spring
- 5. Valve tapers

If the valves are to be reused, set then down in special tool 11 4 480 in a tidy and orderly fashion.



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Fig. 202: Valve Assembly And Components
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 34 560 REPLACING ALL VALVE STEM SEALS (N14)

Special tools required:

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- 11 1 480
- 11 6 380

Necessary preliminary tasks:

- Remove **Cylinder Head** .
- Remove Inlet Camshaft.
- Remove Exhaust Camshaft.
- Remove Roller Cam Follower.
- Remove All Valve Springs .

Firmly press special tool 11 1 480 onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool 11 1 480.

Installation:

Insert all Valves.

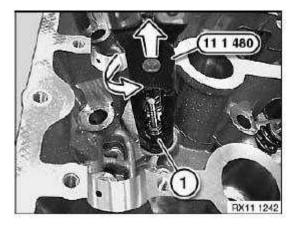


Fig. 203: Special Tool (11 1 480) And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N54 engine, special tool 11 6 380 must be remachined according to the sketch with a 10 mm dia. drill bit to a depth of B = approx. 23 mm.

This modification has already been taken into account for reordering.

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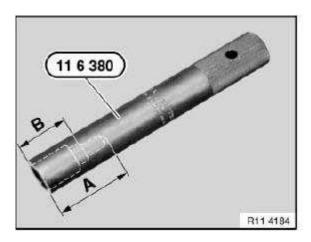


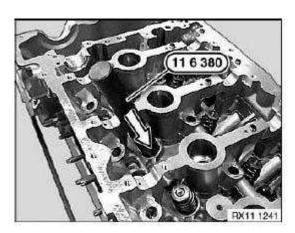
Fig. 204: Special Tool (11 6 380) And Depth Measurement (B) Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lubricate mounting sleeve.

Fit the mounting sleeves (plastic sleeves) supplied in the spare part on the valve stem end

Press on valve stem seal by hand with special tool 11 6 380 as far as it will go.



<u>Fig. 205: Special Tool (11 6 380) And Installation Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 34 715 REPLACING ALL VALVE SPRINGS (N14)

Special tools required:

• 11 4 480

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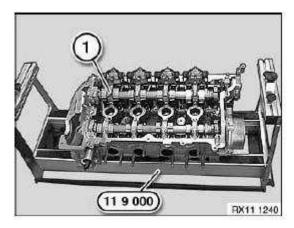
- 11 9 000
- 11 9 006
- 11 9 007
- 11 9 017

Necessary preliminary tasks:

- Remove Cylinder Head Cover..
- Remove Cylinder Head.
- Remove Exhaust Camshaft.
- Remove Inlet Camshaft.
- Remove Roller Cam Follower.

Place cylinder head (1) on special tool 11 9 000.

NOTE: Illustration shows: N12.



<u>Fig. 206: Cylinder Head And Special Tool (11 9 000)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 9 007 on special tool 11 9 006.

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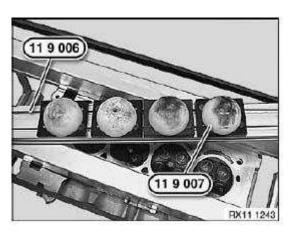
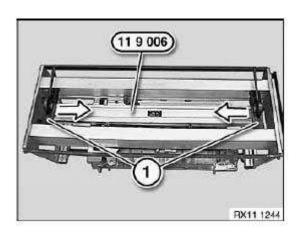


Fig. 207: Special Tool (11 9 007) And (11 9 006) Courtesy of BMW OF NORTH AMERICA, INC.

Align special tool 11 9 006.

Lock eccentrics (1) on special tool 11 9 000 in direction of arrow.



<u>Fig. 208: Eccentrics, Special Tool (11 9 006) And Locking Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring and spring retainer (1) with special tool 11 9 017.

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<u>Fig. 209: Spring Retainer And Special Tool (11 9 017)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve tapers with a magnet.

Remove valve spring and spring retainer.

Set down on special tool 11 4 480 in a tidy and orderly fashion.

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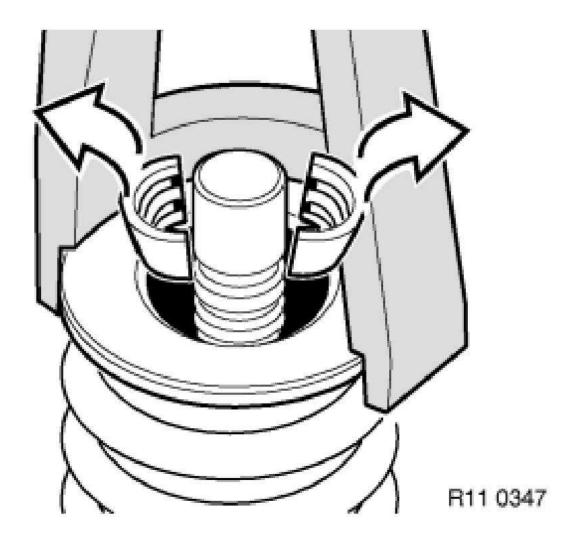


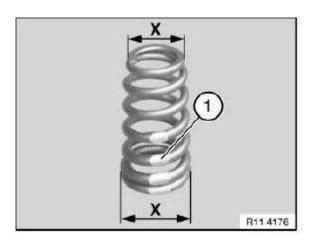
Fig. 210: Valve Spring And Spring Retainer Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

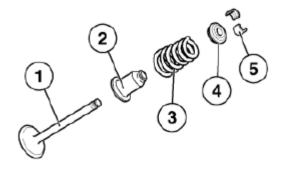
The larger diameter must point downwards to the valve stem seal.



<u>Fig. 211: Valve Spring Color Marking And Dimensions</u> Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

- 1. Valve
- 2. Valve stem seal with spring plate, bottom
- 3. Valve spring
- 4. Top plate spring
- 5. Valve tapers



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Fig. 212: Valve Assembly And Components
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

36 VARIABLE CAMSHAFT TIMING

11 36 042 REMOVING AND INSTALLING/REPLACING INLET ADJUSTMENT UNIT (N14)

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Special tools required:

- 00 9 120
- 11 9 550
- 11 9 551
- 11 9 552
- 11 9 590

IMPORTANT: Mount special tool 11 9 550 to open central bolts on adjustment units and camshafts.

The timing is not determined at firing TDC of cylinder no. 1.

Modified procedure for timing adjustment.

All pistons are in the 90° position.

Check locking of adjustment units.

Necessary preliminary tasks:

• Remove Cylinder Head Cover. .

Slide in special tool 11 9 590 in direction of arrow.

Rotate flywheel (1) at central bolt until firing TDC position at 1st cylinder is reached.

IMPORTANT: The TDC bore can be mixed up in automatic transmissions.

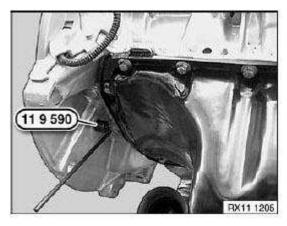


Fig. 213: Flywheel And Special Tool (11 9 590) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check locking on VANOS adjustment unit.

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Attempt to rotate inlet camshaft in direction of rotation at hexagon head.

The adjustment unit is locked in the initial position when the camshaft is non-positively connected to the adjustment unit.

If no fixed connection to the camshaft can be established, the adjustment unit is faulty and must be replaced.

Crank engine at central bolt in direction of rotation until designations (IN and EX) can be read from above.

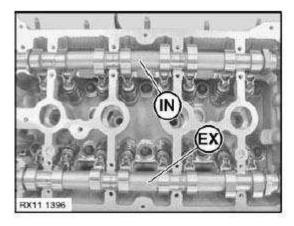


Fig. 214: Inlet And Exhaust Camshaft Designations Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 551 on exhaust camshaft and secure with special tool 11 9 552.

Before fitting special tool, check locking on adjustment unit.

Position special tool 11 9 551 on inlet camshaft and secure with both screws.

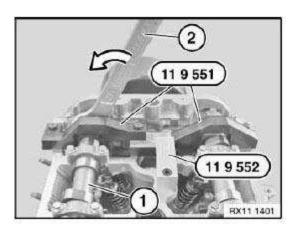


Fig. 215: Special Tool (11 9 522) And (11 9 551) Courtesy of BMW OF NORTH AMERICA, INC.

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Release chain tensioner (1) (have a cleaning cloth ready).

For tightening torque refer to 11 31 4AZ in 1131 CAMSHAFT.

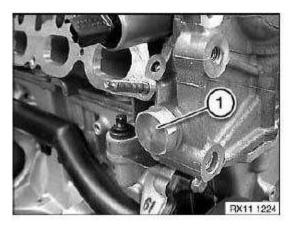


Fig. 216: Chain Tensioner Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

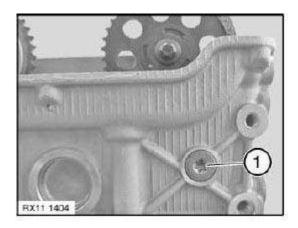


Fig. 217: Screw Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2).

Remove slide rail (1).

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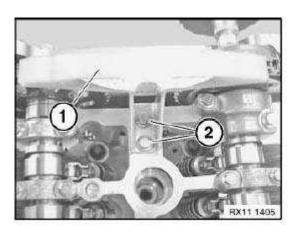


Fig. 218: Clamping Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Release and secure central bolts with special tool 11 9 550 only.

Release central bolt (3).

Remove VANOS adjustment unit (1) from timing chain (2).

VANOS adjustment unit of inlet camshaft is marked with the letters IN.

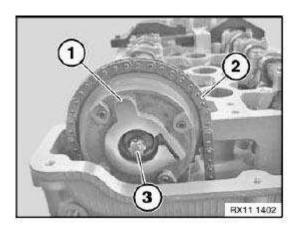


Fig. 219: Central Bolt, VANOS Adjustment Unit And Timing Chain Courtesy of BMW OF NORTH AMERICA, INC.

Install slide rail (1).

Insert screws (2).

For tightening torque refer to 11 31 2AZ in 11 31 CAMSHAFT.

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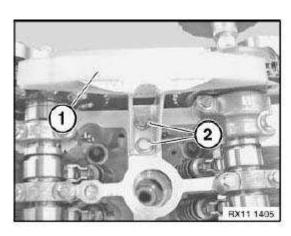


Fig. 220: Slide Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 340 into cylinder head.

Pretension timing chain with special tool to 0.4 Nm.

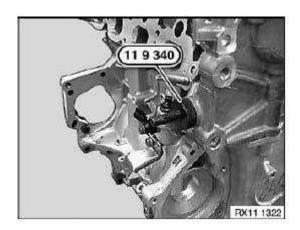


Fig. 221: Special Tool (11 9 340)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation position of adjustment unit can be freely selected.

Secure central bolt (1) with special tool 00 9 120.

For tightening torque refer to 11 36 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL.

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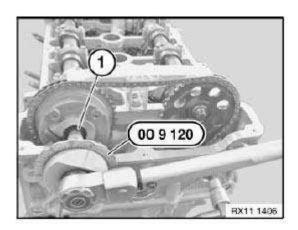


Fig. 222: Central Bolt And Special Tool (00 9 120) Courtesy of BMW OF NORTH AMERICA, INC.

Fit **Chain Tensioner**.

Check **Timing**.

Assemble engine.

11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N14)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunction if valves are contaminated:

- Rough running.
- OBD fault entry.
- Exhaust emission behavior.
- Low engine power.

Necessary preliminary tasks:

• Remove acoustic cover

Disconnect plug connection for solenoid valve (3) - inlet.

Release screw (1).

Remove solenoid valve (2) for inlet side.

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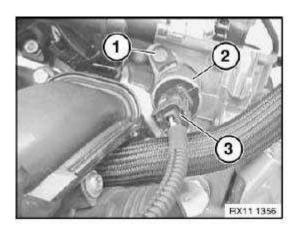


Fig. 223: Solenoid Valve, Plug Connection And Screw Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring on solenoid valve.

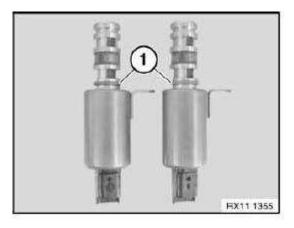


Fig. 224: Solenoid Valve Sealing Ring Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

40 OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (N14)

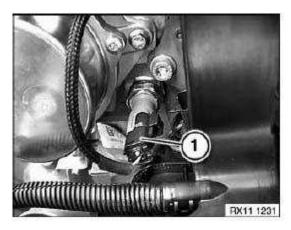
Special tools required:

- 11 7 020
- 11 9 560

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- 13 3 061
- 13 3 063
- 13 6 051
- 13 6 054

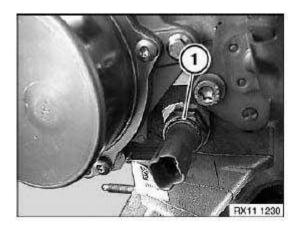
Disconnect plug connection on oil pressure switch (1)



<u>Fig. 225: Oil Pressure Switch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release oil pressure switch (1) with special tool 11 7 020.

For tightening torque refer to 12 61 1AZ in 11 61 INTAKE MANIFOLD.



<u>Fig. 226: Oil Pressure Switch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 9 560 with sealing ring on cylinder head.

Secure pressure gauge $13\ 3\ 063$ to special tool $11\ 9\ 560$.

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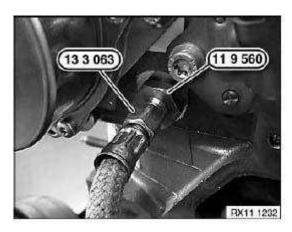


Fig. 227: Special Tool (11 9 560) And (13 3 063) Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with diagnosis tester.

Connect special tools 11 9 560 / 13 6 054 and 13 6 051.

Check engine oil pressure with pressure gauge.

Connect special tools 11 9 560 / 13 3 063 and 13 3 061.

Start engine and check engine oil pressure.

Specified values.

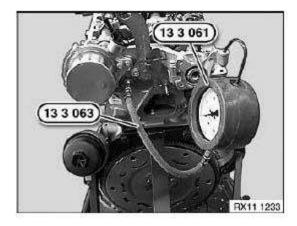


Fig. 228: Special Tool (13 3 061) And (13 3 063) Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

41 OIL PUMP WITH FILTER AND DRIVE

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11 41 000 REMOVING AND INSTALLING OIL PUMP (N14)

Necessary preliminary tasks:

• Removing Oil Pan.

Pull off cover (1) in direction of arrow.

Installation:

Replace cover (1).

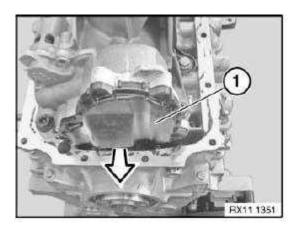


Fig. 229: Oil Pump Cover And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

For tightening torque refer to 11 41 2AZ in 11 41 OIL PUMP WITH STRAINER AND DRIVE .

Grip crankshaft central bolt (2) to release central bolt (1).

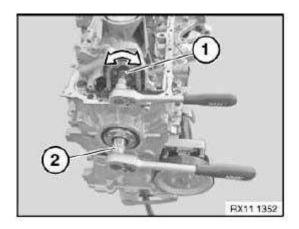


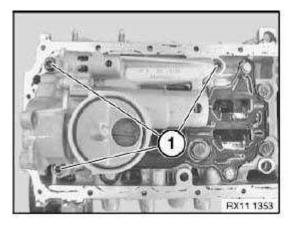
Fig. 230: Crankshaft Central Bolt And Central Bolt

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Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

For tightening torque refer to 11 41 1AZ in 11 41 OIL PUMP WITH STRAINER AND DRIVE .



<u>Fig. 231: Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

43 OIL FILLING, DIPSTICK

11 43 000 REMOVING AND INSTALLING/REPLACING GUIDE TUBE FOR DIPSTICK (N14)

Necessary preliminary tasks:

• Pull dipstick out of guide tube.

Release screw (2).

For tightening torque refer to 11 43 1AZ in 11 43 OIL DIPSTICK.

Pull dipstick (1) up in direction of arrow.

Installation:

Replace O-ring.

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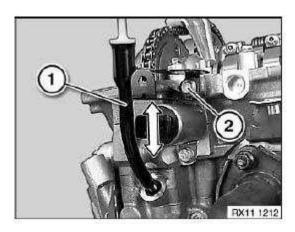


Fig. 232: Dipstick, Screw And Removal Direction Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check engine oil level, top up if necessary

51 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N14)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

• Remove Friction Gear .

Release screws (1).

Installation:

Replace seal.

Clean sealing surfaces.

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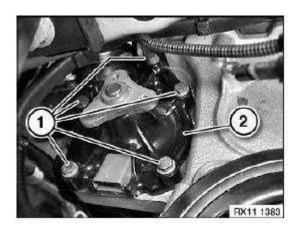


Fig. 233: Water Pump Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent **Cooling System** and check for leaks.

53 THERMOSTAT AND CONNECTIONS

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N14)

Special tools required:

• 17 2 050

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Drain Coolant from radiator.
- Remove intake air **Manifold**.

Release lock (1) on coolant pipe in direction of arrow.

NOTE:

Release metal hose clamps with special tool 17 2 050.

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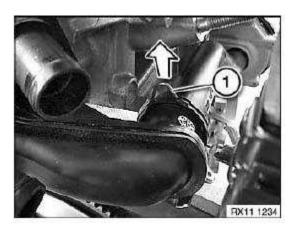


Fig. 234: Lock And Removal Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on coolant thermostat.

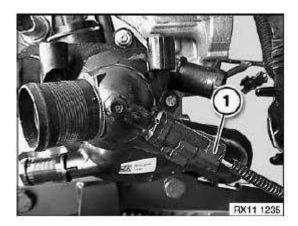


Fig. 235: Coolant Thermostat Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on coolant temperature sensor.

Unfasten screws (2 and 3).

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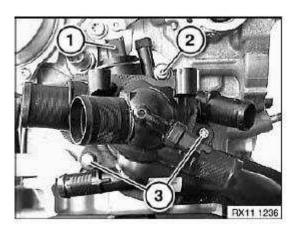
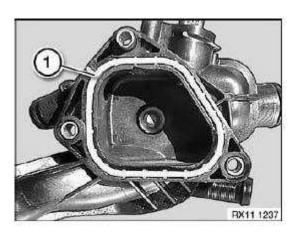


Fig. 236: Coolant Thermostat Plug Connection And Screws Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace seal (1).



<u>Fig. 237: Coolant Thermostat Housing Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

For tightening torque refer to 11 53 1AZ in 11 53 THERMOSTAT AND CONNECTIONS.

Assemble engine.

11 53 590 REMOVING AND INSTALLING/REPLACING AUXILIARY WATER PUMP (N14)

Special tools required:

• 17 2 052

Necessary preliminary tasks:

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• Drain **Coolant** from radiator.

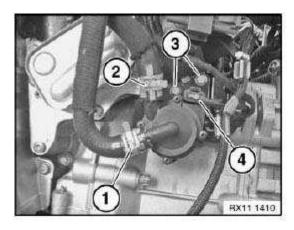
Release hose clamps (1 and 2) with special tool 17 2 052.

Detach coolant hoses from auxiliary water pump.

Disconnect plug connection (4).

Release screws (3).

For tightening torque refer to 11 53 3AZ in 11 53 THERMOSTAT AND CONNECTIONS.



<u>Fig. 238: Hose Clamps, Plug Connection And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Vent Cooling System .

Assemble engine.

61 INTAKE MANIFOLD

11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N14)

Necessary preliminary tasks:

- Disconnect **Battery Negative** lead.
- Remove suction filter housing.

NOTE: Picture shows EPPC removed.

Disconnect vacuum lines on vacuum connection (1 and 2).

Disconnect plug connection at EPPC.

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Installation:

OUT connector (1) is identified with a green ring.

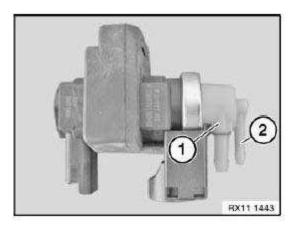
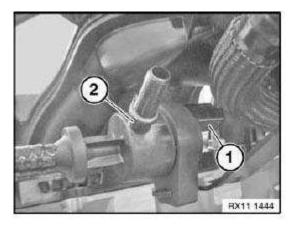


Fig. 239: Vacuum Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on tank vent valve (2).

Detach hose from tank vent valve (2).



<u>Fig. 240: Plug Connection And Tank Vent Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

For tightening torque refer to 11 61 1AZ in 11 61 INTAKE MANIFOLD.

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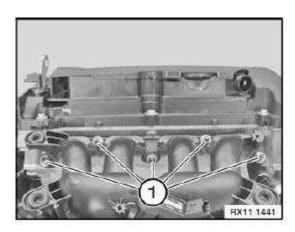


Fig. 241: Nuts Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

OUT connector on EPPC is identified with a green ring.

Vacuum line (1) is fitted with a green ring (OUT).

Vacuum line (2) without green ring (VAC).

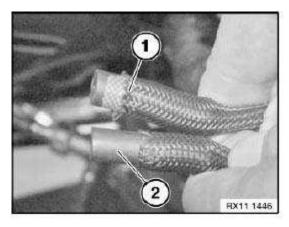


Fig. 242: Vacuum Lines With Green (Out) And Without Green (VAC) Ring Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all seals.

Assemble engine.

11 61 365 REPLACING LEFT CHARGE-AIR DUCT (N14)

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IMPORTANT: Charge-air hoses with clamp fastenings must be installed dry and free from grease!

If charge-air hoses with clamp fastenings are not installed dry and free from grease, this may result in turbocharger failure!

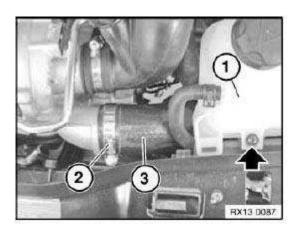
Release screw and disengage coolant expansion tank (1) from rubber mount.

Lay expansion tank (1) to one side (do not remove).

Installation:

Make sure bearing journal is installed in correct position in rubber mount.

Release clamp (2) and detach charge-air hose (3).



<u>Fig. 243: Clamp, Charge-Air Hose, Mounting Screw And Coolant Expansion Tank</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp and detach charge-air hose (1).

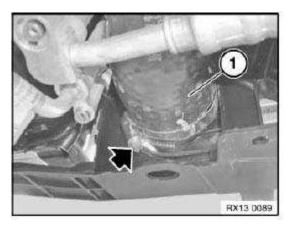


Fig. 244: Charge-Air Hose And Mounting Clamp

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Courtesy of BMW OF NORTH AMERICA, INC.

Release screw and remove charge-air duct (1).

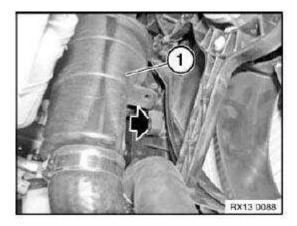


Fig. 245: Charge-Air Duct And Mounting Screw Courtesy of BMW OF NORTH AMERICA, INC.

11 61 362 REPLACING RIGHT CHARGE-AIR DUCT (N14)

Necessary preliminary tasks:

• Remove <u>Halogen</u> or <u>Xenon</u> right headlight

IMPORTANT: Charge-air hoses with clamp fastenings must be installed dry and free from grease!

If charge-air hoses with clamp fastenings are not installed dry and free from grease, this may result in turbocharger failure!

Release screw and remove holder (1).

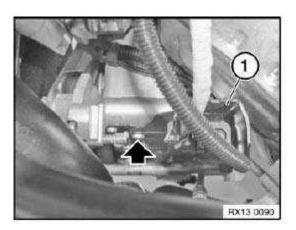


Fig. 246: Right Charge-Air Duct Holder And Retaining Screw

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Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt.

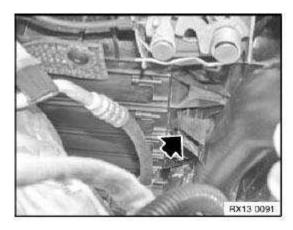


Fig. 247: Charge-Air Duct Mounting Bolt Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp and detach charge-air hose (1).

Installation:

Fit charge-air hose dry and without grease.

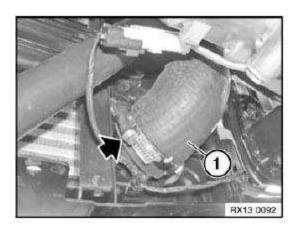


Fig. 248: Charge-Air Hose And Clamp Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt.

Release screws (1).

For tightening torque refer to 51 23 3AZ in 51 23 HOOD/BONNET LOCKS.

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Release screw (2).

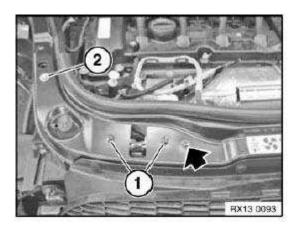


Fig. 249: Charge-Air Hose Mounting Bolt And Screws Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt.

Release screws (1).

For tightening torque refer to 51 11 7AZ in <u>51 11 FRONT BUMPER</u>.

Unlock connector (2) and remove.

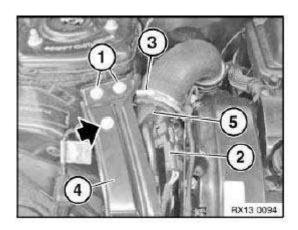
Release clamp (3).

Raise lock carrier (4) slightly.

Detach charge-air duct (5) from hose and remove.

Installation:

Fit charge-air hose dry and without grease.



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<u>Fig. 250: Lock Carrier, Charge-Air Duct, Clamp, Connector, Bolt And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

65 SUPERCHARGER WITH CONTROL

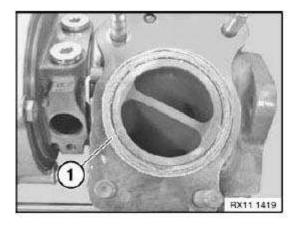
11 65 020 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER (N14)

Necessary preliminary tasks:

• Remove **Exhaust Manifold**

Installation:

Replace seal.



<u>Fig. 251: Exhaust Turbocharger Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

66 VACUUM PUMP

11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N14)

Release vacuum connection to brake booster.

Release screws (1).

For tightening torque refer to 11 66 1AZ in 11 66 VACUUM PUMP.

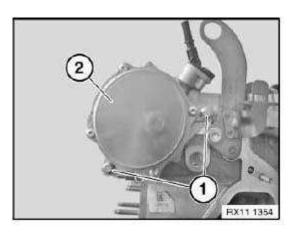
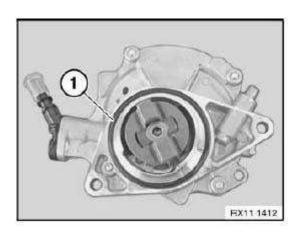


Fig. 252: Vacuum Pump Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring (1).



<u>Fig. 253: Vacuum Pump Sealing Ring</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

78 EMISSION CONTROL, OXYGEN SENSOR

11 78 510 REMOVING AND INSTALLING/REPLACING CONTROL SENSOR (N14)

Special tools required:

• 11 7 020

WARNING: Scalding hazard!

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Only perform these tasks after the exhaust system has cooled down.

Installation:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound to thread.

The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for control sensor.

Release oxygen sensor (1) with special tool 11 7 020.

For tightening torque refer to 11 78 1AZ in <u>11 78 EMISSIONS CONTROL, CONTROL SENSOR</u> / MONITOR SENSOR.

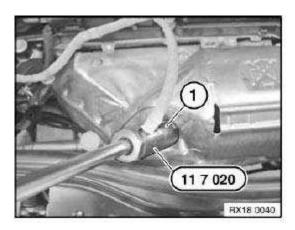


Fig. 254: Oxygen Sensor And Special Tool (11 7 020) Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 78 545 REMOVING AND INSTALLING/REPLACING MONITOR SENSOR (N14)

Special tools required:

• 11 7 020

WARNING: Scalding hazard!

Only perform these tasks after the exhaust system has cooled down.

Installation:

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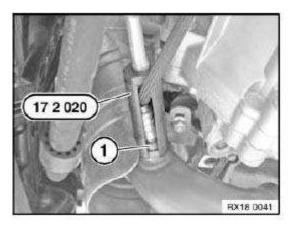
If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound to thread.

The part of the oxygen monitor sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for monitor sensor.

Release monitor sensor (1) with special tool 11 7 020.

For tightening torque refer to 11 78 1AZ in <u>11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITOR SENSOR</u>.



<u>Fig. 255: Monitor Sensor And Special Tool (11 7 020)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

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2007 ENGINE

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00 ENGINE, GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

• Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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- Impaired sight
- o Irritation of the eyes
- o Reddening of the skin
- o Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eyerinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

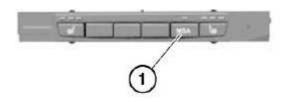
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



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<u>Fig. 1: Identifying MSA Means Of Button</u> Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

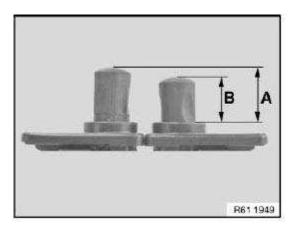


Fig. 2: Identifying Engine Hood/Bonnet Contact Setting Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

Observe instructions in diagnosis tool

NOTE: For further information on automatic engine start-stop system (MSA):

• Refer to **ELECTRICAL SYSTEMS**.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: Refer to 00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN and 00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN.

Recycling:

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Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N12)

Release screws (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Release acoustic cover at retainers (2).

Lift off acoustic cover in direction of arrow.

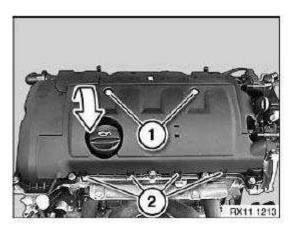


Fig. 3: Lifting Acoustic Cover
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 050 REMOVING AND INSTALLING ENGINE WITH TRANSMISSION (N12)

Special tools required:

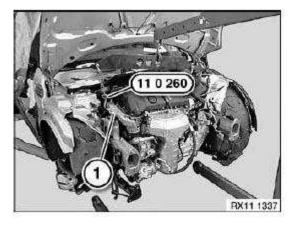
11 0 260

Necessary preliminary tasks:

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- Lift engine hood into assembly position.
- Remove exhaust system.
- Drain engine oil.
- Disconnect negative battery lead.
- Remove both drive shafts.
- Remove air cleaner housing.
- Remove fan cowl with electric fan.
- Detach all coolant hoses from engine.
- Detach vacuum line from brake booster.
- Unfasten engine wiring harness and lay to one side.
- Remove complete front panel

Attach special tool 11 0 260 to lifting eye (1) at engine end



<u>Fig. 4: Identifying Special Tool (11 0 260) To Lifting Eye To Engine</u> Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 0 260 to lifting eye (1) at transmission end

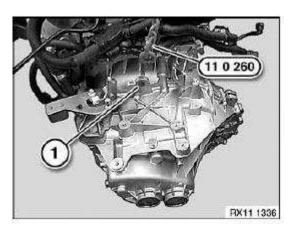


Fig. 5: Identifying Special Tool (11 0 260) On Transmission

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Courtesy of BMW OF NORTH AMERICA, INC.

Release transmission and engine mounts.

Remove engine with special tool 11 0 260 towards front.

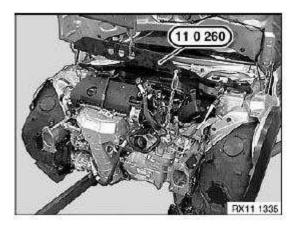


Fig. 6: Identifying Special Tool (11 0 260) On Engine Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N12, N14)

Special tools required:

- 00 0 200
- 00 0 202
- 00 0 204
- 00 0 208
- 00 0 490

WARNING: Risk of injury!

Observe following instructions relating to special tool:

- 1. Prior to each use, check the special tools for defects, modifications and operational reliability.
- 2. Damaged/modified special tools must not be used!
- 3. No changes or modifications may be made to the special tools!
- 4. Keep special tools dry, clean and free of grease.

Necessary preliminary tasks:

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• Remove lock bridge.

Assemble cross member 00 0 200 with special tools 00 0 202, 00 0 204, 00 0 208.

Modification:

Remove front supports (1).

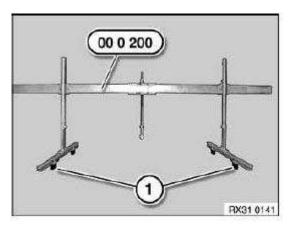


Fig. 7: Identifying Special Tools (00 0 200) Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 00 0 490 on left and right to cross member 00 0 200 .

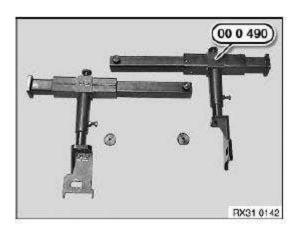


Fig. 8: Identifying Special Tools (00 0 490)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not damage Bowden cable (1)!

With the aid of an assistant, place cross member 00 0 200 on spring strut tower and secure special tool 00 0 490 with knurled screws (2) on engine support.

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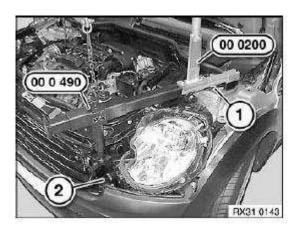


Fig. 9: Placing Cross Member (00 0 200) On Spring Strut Tower Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction. Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

Align cross member 00 0 200 such that the spindle 00 0 202 is positioned correctly over the lifting eye.

Secure suitable chain to spindle 00 0 200 and attach to lifting eye (1).

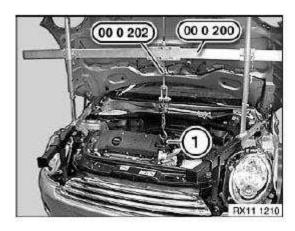


Fig. 10: Identifying Special Tool (00 0 200 And 00 0 202) Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!

Tighten all adjusting screws, knurled screws and nuts on cross member 00 0 200 and on special tool 00 0 490.

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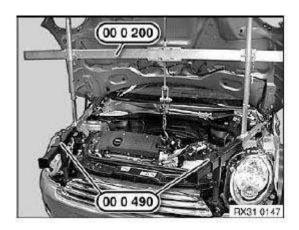


Fig. 11: Identifying Special Tool (00 0 490 And 00 0 490) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Bolts must be slackened to prevent elongation of rubber mounts in bracket (1)!

Slacken bolts (2, 3).

Installation:

Low engine first onto engine or transmission mounts and then tighten down bolts (2, 3).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

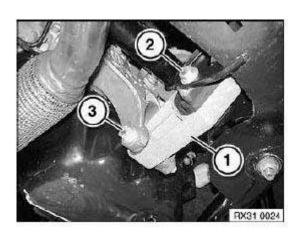


Fig. 12: Identifying Rubber Mounts In Bracket With Slacken Bolts Courtesy of BMW OF NORTH AMERICA, INC.

Left side only:

Remove transmission support bracket

Right side only:

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Unscrew nut (1).

Installation:

Replace self-locking nut.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

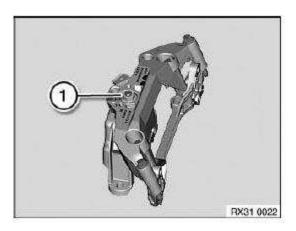


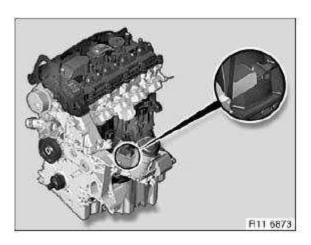
Fig. 13: Identifying Self-Locking Nut Courtesy of BMW OF NORTH AMERICA, INC.

Raise engine approx. 10 mm with crossmember.

ENGINE IDENTIFICATION

Drive in engine numbers at marked surface with impact tool.

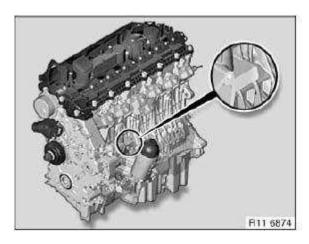
M47 / M47TU / M47T2



<u>Fig. 14: Identifying Engine Identification Number - M47 / M47TU / M47T2</u> Courtesy of BMW OF NORTH AMERICA, INC.

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M57 / M57TU / M57T2



<u>Fig. 15: Identifying Engine Identification Number - M57 / M57TU / M57T2</u> Courtesy of BMW OF NORTH AMERICA, INC.

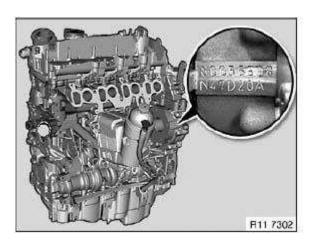
M67 / M67TU



<u>Fig. 16: Identifying Engine Identification Number - M67 / M67TU</u> Courtesy of BMW OF NORTH AMERICA, INC.

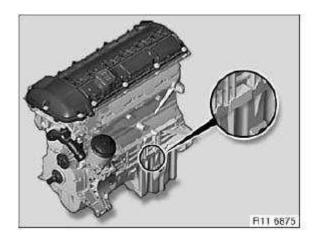
N47

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<u>Fig. 17: Identifying Engine Identification Number - N47</u> Courtesy of BMW OF NORTH AMERICA, INC.

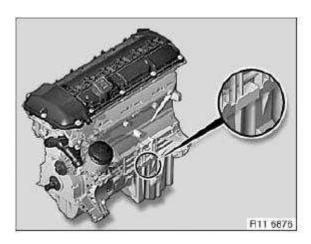
M52 / M52TU



<u>Fig. 18: Identifying Engine Identification Number - M52 / M52TU</u> Courtesy of BMW OF NORTH AMERICA, INC.

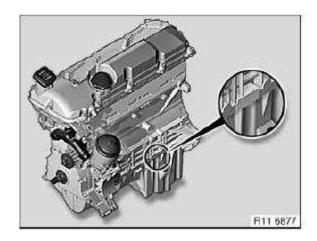
M54

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<u>Fig. 19: Identifying Engine Identification Number - M54</u> Courtesy of BMW OF NORTH AMERICA, INC.

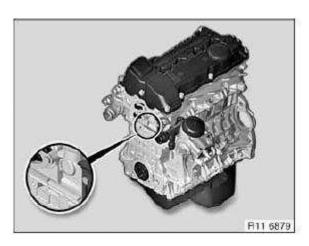
M56



<u>Fig. 20: Identifying Engine Identification Number - M56</u> Courtesy of BMW OF NORTH AMERICA, INC.

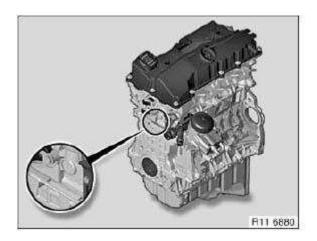
N40 / N45

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<u>Fig. 21: Identifying Engine Identification Number - N40 / N45</u> Courtesy of BMW OF NORTH AMERICA, INC.

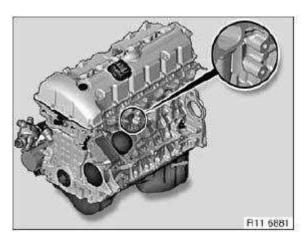
N42 / N46 / N46T



<u>Fig. 22: Identifying Engine Identification Number - N42 / N46 / N46T</u> Courtesy of BMW OF NORTH AMERICA, INC.

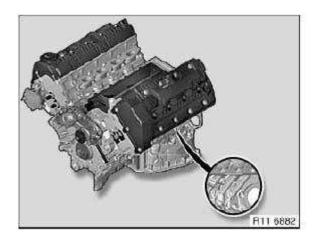
N51 / N52 / N52K / N53 / N54

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 $\frac{Fig.~23:~Identifying~Engine~Identification~Number~-~N51~/~N52~/~N52K~/~N53~/~N54}{Courtesy~of~BMW~OF~NORTH~AMERICA,~INC.}$

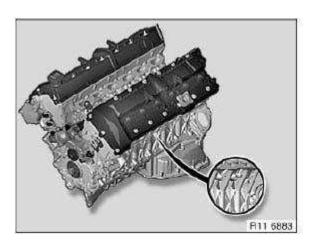
N62



<u>Fig. 24: Identifying Engine Identification Number - N62</u> Courtesy of BMW OF NORTH AMERICA, INC.

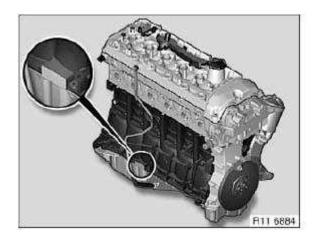
N73

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<u>Fig. 25: Identifying Engine Identification Number - N73</u> Courtesy of BMW OF NORTH AMERICA, INC.

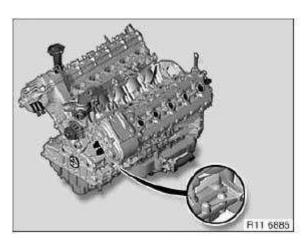
S54



<u>Fig. 26: Identifying Engine Identification Number - S54</u> Courtesy of BMW OF NORTH AMERICA, INC.

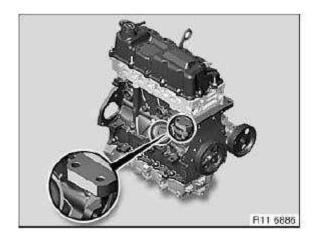
S85

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<u>Fig. 27: Identifying Engine Identification Number - S85</u> Courtesy of BMW OF NORTH AMERICA, INC.

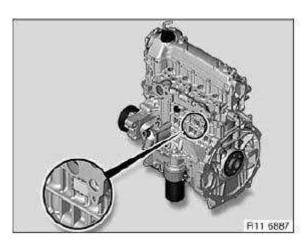
W10 / W11



<u>Fig. 28: Identifying Engine Identification Number - W10 / W11</u> Courtesy of BMW OF NORTH AMERICA, INC.

W17

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<u>Fig. 29: Identifying Engine Identification Number - W17</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

MOUNTING ENGINE ON ASSEMBLY STAND (N12)

Special tools required:

- 00 2 300
- 11 9 530

Necessary preliminary tasks:

• Remove engine.

Bolt engine or engine block to special tool $11\ 9\ 530$.

Mount engine with special tool 11 9 530 on special tool 00 2 300.

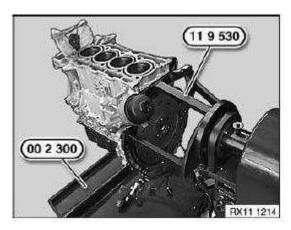


Fig. 30: Identifying Special Tool (11 9 530 And 00 2 300) On Engine Block

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Courtesy of BMW OF NORTH AMERICA, INC.

12 CYLINDER HEAD WITH COVER

11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N12)

Necessary preliminary tasks:

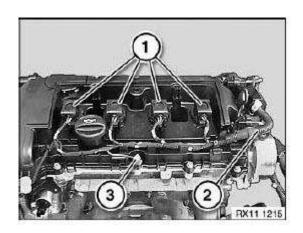
- Remove acoustic cover
- Remove rod-type ignition coils.

Disconnect plug connection at ignition coils (1).

Unfasten engine wiring harness (2) at cylinder head cover.

Release ground connection (3).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



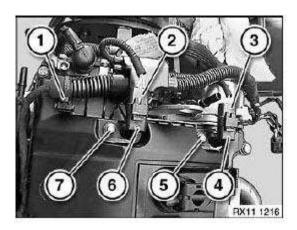
<u>Fig. 31: Identifying Ignition Coils, Engine Wiring Harness And Ground Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (2 and 3).

If necessary, release sensors (4 and 6).

Unfasten engine wiring harness (1) at cylinder head cover.

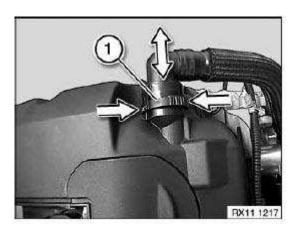
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<u>Fig. 32: Identifying Ignition Coils, Engine Wiring Harness And Plug Connections With Sensors</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten engine vent hose at lock (1) in direction of arrow.

Detach engine vent hose in direction of arrow.



<u>Fig. 33: Detaching Engine Vent Hose</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten engine wiring harness (1) at cylinder head cover.

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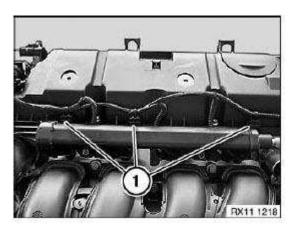


Fig. 34: Identifying Engine Wiring Harness Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) at coolant sensor.

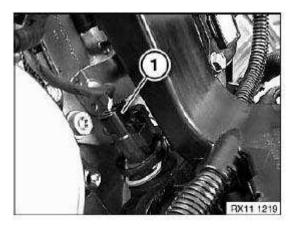
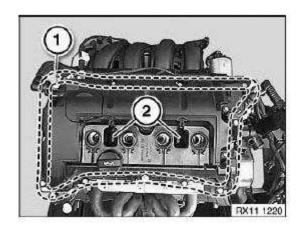


Fig. 35: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts in areas (1 and 2).



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<u>Fig. 36: Identifying Engine Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replace seal (1).

Replace all seals (2).

Installation:

Clean all sealing surfaces.

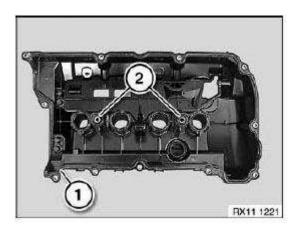


Fig. 37: Identifying Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe tightening sequence (1 to 13).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

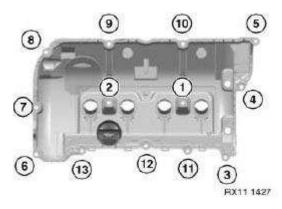


Fig. 38: Identifying Tightening Sequence For Engine Bolts Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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11 12 100 REMOVING AND INSTALLING/SEALING CYLINDER HEAD (N12)

Special tools required:

- 11 2 250
- 11 4 471
- 11 4 472
- 11 9 590
- 11 9 630

IMPORTANT: Fit new cylinder head screws.

Do not wash off bolt coating.

There must not be any coolant, water or oil present in the pocket holes (risk of corrosion and cracking).

Necessary preliminary tasks:

- Remove exhaust system.
- Drain coolant.
- Drain engine oil.
- Remove exhaust manifold.
- Remove intake air manifold.
- Remove oil dipstick.
- Detach coolant hoses from cylinder head.
- Remove cylinder head cover. Refer to 12 CYLINDER HEAD WITH COVER.
- Remove inlet and exhaust adjustment unit.

Secure crankshaft with special tool 11 9 590.

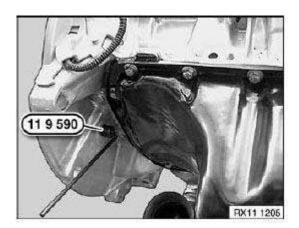


Fig. 39: Identifying Special Tool (11 9 590) On Crankshaft Courtesy of BMW OF NORTH AMERICA, INC.

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NOTE: Remove and install cylinder head in installed state.

Suspend engine with engine crane (1) from lifting eye (2).

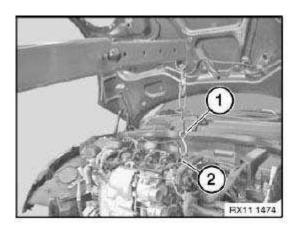


Fig. 40: Lifting Engine With Crane Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Remove and install cylinder head in installed state.

Move front panel into assembly position.

Release upper alternator screws, do not remove alternator.

Remove right engine mount.

Secure special tool 11 9 630 with standard bolts (1 and 2).

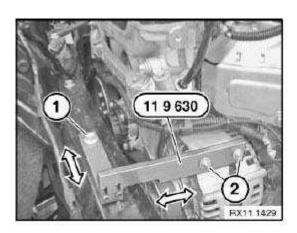


Fig. 41: Identifying Special Tool (11 9 630)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

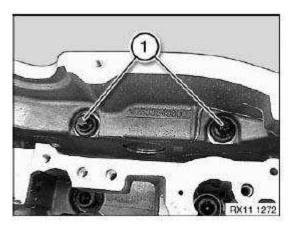
IMPORTANT: If the timing chain is stowed in the gear case, the crankshaft must no longer be

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rotated. The timing chain may jam on the crankshaft gear.

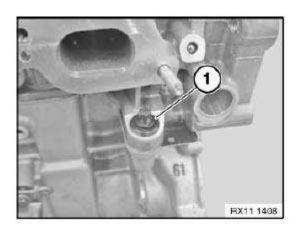
Installation:

Only during assembly is the timing chain lifted out with a hook.



<u>Fig. 42: Identifying Screws (Timing Chain)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).



<u>Fig. 43: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts with special tool 11 2 250.

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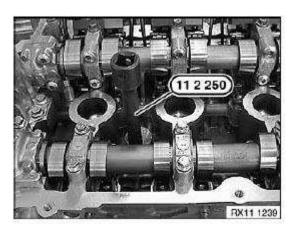
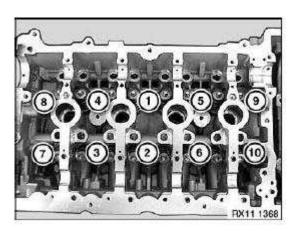


Fig. 44: Identifying Special Tool (11 2 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts from outside inwards (10 to 1).

NOTE: Remove shims with a magnet.

Illustration shows camshafts removed.

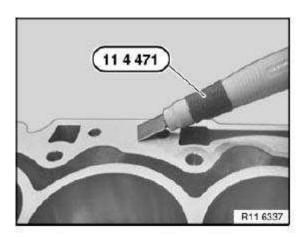


<u>Fig. 45: Identifying Cylinder Head Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool 11 4 471 to remove coarse gasket remnants from sealing faces of cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

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<u>Fig. 46: Identifying Special Tool (11 4 471)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove fine gasket remnants with special tool 11 4 472.

IMPORTANT: Do not use any metal-cutting tools.

There must not be any coolant, water or oil present in the pocket holes (risk of corrosion and cracking).

Clean all pocket holes.

Replace cylinder head gasket.

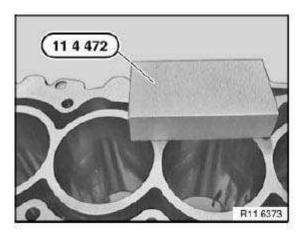


Fig. 47: Identifying Special Tool (11 4 472) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fit new cylinder head screws.

Do not wash off bolt coating.

Attach shims to cylinder head bolts.

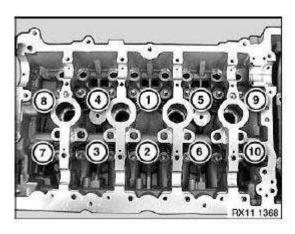
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Shims can drop into the engine (risk of damage!).

Secure cylinder head bolts from inside outwards (1 to 10).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

NOTE: Illustration shows camshafts removed.



<u>Fig. 48: Identifying Cylinder Head Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure bolts (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

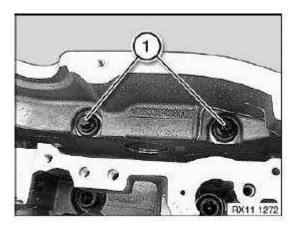
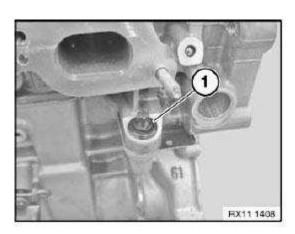


Fig. 49: Identifying Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten the screw (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

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<u>Fig. 50: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N12)

Special tools required:

• 11 4 470

Necessary preliminary tasks:

• Remove cylinder head .

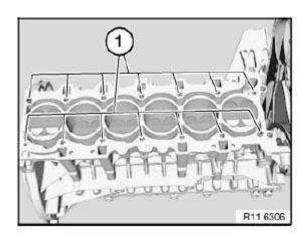
Remove remnants of oil and dirt from pocket holes (1).

IMPORTANT: Work on sealing face on engine block and on cylinder head with special tool 11 4 470 only.

Do not use any metal-cutting tools.

NOTE: Illustration shows N52.

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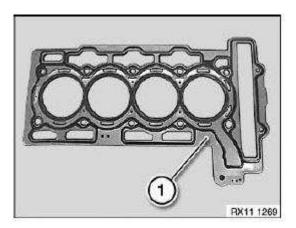
<u>Fig. 51: Identifying Cylinder Head Holes</u> Courtesy of BMW OF NORTH AMERICA, INC.

Note identification marking on head gasket.

IMPORTANT: Rubber coating on cylinder head gasket must not be damaged under any circumstances.

If the cylinder head is remachined, a thicker coating + 0.3 mm is also available for service personnel.

Gasket (1) is a sheet-metal gasket

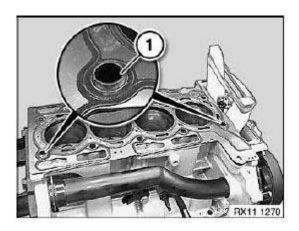


<u>Fig. 52: Identifying Cylinder Head Gasket</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and firm seating.

Lay cylinder head gasket on engine block.

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<u>Fig. 53: Identifying Adapter Sleeves</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for deviation from flatness.

Check cylinder head for water leaks. Refer to 11 12 729 CHECKING CYLINDER

HEAD FOR WATER LEAKS (N12).

Assemble engine.

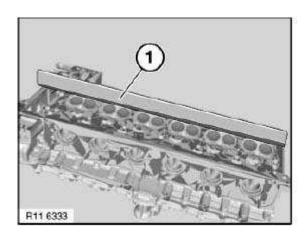
11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N12)

Necessary preliminary tasks:

- Remove cylinder head.
- Remove exhaust camshaft.
- Remove intermediate lever on inlet side.

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

NOTE: Max. deviation from level (longitudinal) 0.10 mm Picture show N52.



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Fig. 54: Identifying Cylinder Head Sealing Faces Courtesy of BMW OF NORTH AMERICA, INC.

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

NOTE: Max. deviation from level (transversal) 0.05 mm Picture show N52.

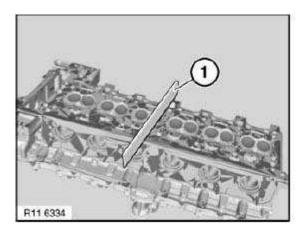


Fig. 55: Identifying Cylinder Head Sealing Faces Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for water leaks. Refer to <u>11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N12)</u>.

Assemble engine.

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N12)

Special tools required:

- 11 9 521
- 11 9 522
- 11 9 523

Necessary preliminary tasks:

- Remove cylinder head.
- Disassemble cylinder head.

Install special tool 11 9 521 with special tool 11 9 523.

Installation:

Install special tool 11 9 521 so that all water ducts are sealed.

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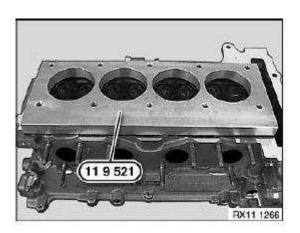


Fig. 56: Identifying Special Tool (11 9 521)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 9 523 to 25 Nm.

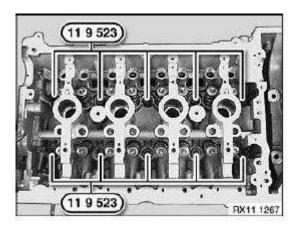


Fig. 57: Identifying Special Tool (11 9 523 And 11 9 523) Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 522 into place with existing screws (1 and 3) of coolant thermostat.

Sealing flange must rest flat.

NOTE: Compressed air at valve (2) must not exceed 3 bar.

Heat cylinder head to 60°.

Visually check for bubble formation in a water bath.

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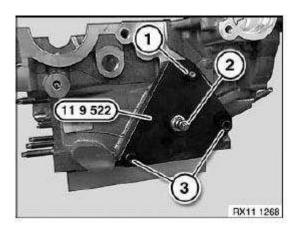


Fig. 58: Identifying Special Tool (11 9 522) With Existing Screws Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

13 OIL SUMP

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N12)

Special tools required:

- 11 4 470
- 11 9 581
- 11 9 582

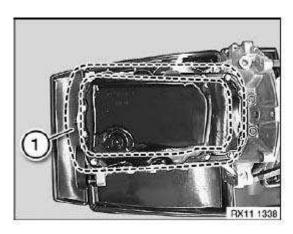
Necessary preliminary tasks:

• Drain engine oil.

Release oil sump bolts in area of line (1).

Tightening torque: Refer to ENGINE - TIGHTENING TORQUES.

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<u>Fig. 59: Identifying Oil Sump Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) over exhaust manifold with special tools 11 9 582 and 11 9 581.

Tightening torque: Refer to **ENGINE - TIGHTENING TORQUES**.

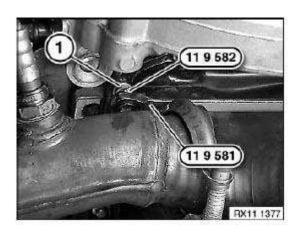


Fig. 60: Identifying Special Tools (11 9 582 And 11 9 581) Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing face (1) with special tool 11 4 470.

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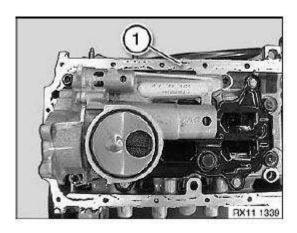


Fig. 61: Identifying Sealing Face Courtesy of BMW OF NORTH AMERICA, INC.

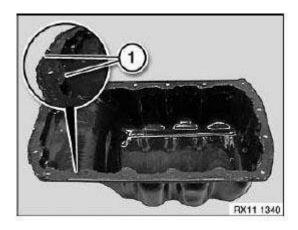
IMPORTANT: Do not use adhesive sealing bead.

Remove protruding or surplus sealing beads (1) with a suitable tool.

Installation:

Do not use liquid seal.

A metal substrate gasket is available for repairs (see BMW Parts Service).



<u>Fig. 62: Identifying Sealing Beads</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

14 HOUSING COVER

11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N12)

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Special tools required:

- 11 9 601
- 11 9 602
- 11 9 603

IMPORTANT: PTFE ring is supplied with a supporting ring.

Supporting ring is required as an installation tool.

Do not touch inner sealing face of PTFE ring with fingers (risk of damage) .

Necessary preliminary tasks:

- Remove vibration damper.
- Remove A/C line from compressor.

IMPORTANT: Do not release central bolt.

If the central bolt is released, the sprocket wheels of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. The camshafts to the crankshaft can warp (risk of damage).

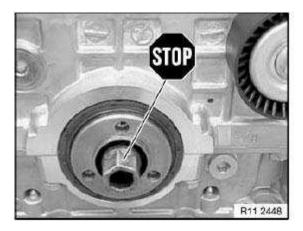
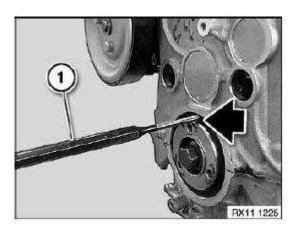


Fig. 63: Identifying Crankshaft Central Bolt Courtesy of BMW OF NORTH AMERICA, INC.

Drive PTFE ring inwards with a drift (1) until PTFE ring tilts outwards at bottom.

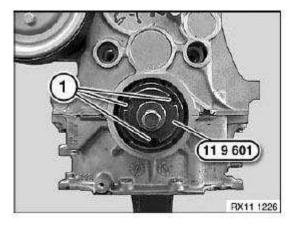
IMPORTANT: PTFE ring can slip inwards.

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<u>Fig. 64: Identifying PTFE Ring Inwards With Drift</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 9 601 with screws (1) to crankshaft to 15 Nm.



<u>Fig. 65: Identifying Special Tool (11 9 601) To Crankshaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

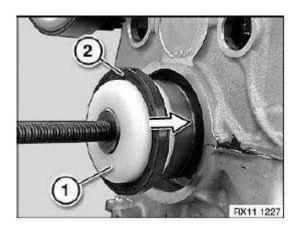
Installation:

Apply a light coating of oil to special tool 11 9 601.

Position PTFE ring (2) with supporting ring (1) on special tool 11 9 601.

Push PTFE ring (2) over supporting ring (1) in direction of arrow up to crankcase.

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<u>Fig. 66: Pushing PTFE Ring Over Supporting Ring To Crankcase</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove supporting ring from special tool 11 9 601.

NOTE: Supporting ring is no longer needed.

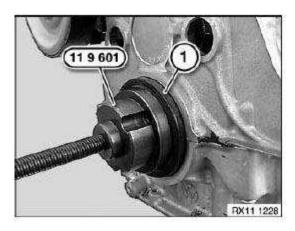


Fig. 67: Identifying Special Tool (11 9 601) On Supporting Ring Courtesy of BMW OF NORTH AMERICA, INC.

Draw in PTFE ring with special tool 11 9 602 in conjunction with special tool 11 9 603 until flush.

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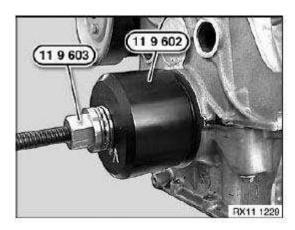


Fig. 68: Identifying Special Tool (11 9 603 And 11 9 602) Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (N12)

Special tools required:

- 11 9 611
- 11 9 612
- 11 9 613

Necessary preliminary tasks:

- Remove transmission.
- Remove flywheel.

Brake off PTFE ring (2) with a drift (1).

IMPORTANT: Risk of damage to crankcase and to crankshaft!

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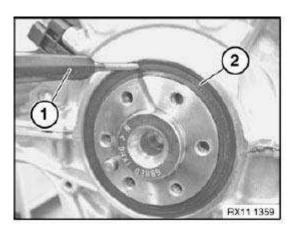


Fig. 69: Identifying PTFE Ring With Drift Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 9 611 with supplied screws (1) to crankshaft.

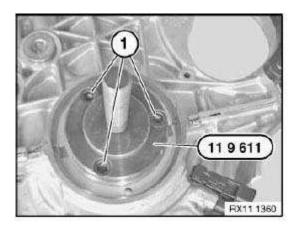
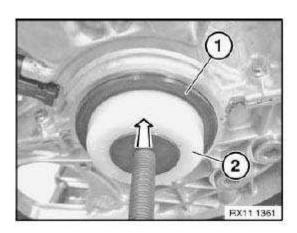


Fig. 70: Identifying Special Tool (11 9 611) To Crankshaft Courtesy of BMW OF NORTH AMERICA, INC.

Position PTFE ring (1) with supporting ring (2) on special tool 11 9 611.

Push PTFE ring (1) in direction of arrow over supporting ring (2) onto crankshaft.

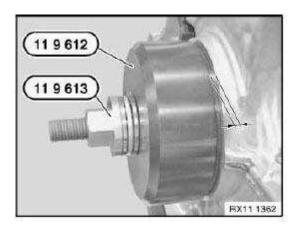
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<u>Fig. 71: Identifying PTFE Ring Supporting Ring Into Crankshaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9 612.

Draw in PTFE ring with special tool 11 9 613.



<u>Fig. 72: Identifying Special Tool (11 9 612 And 11 9 613)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 9 612 up to engine block.

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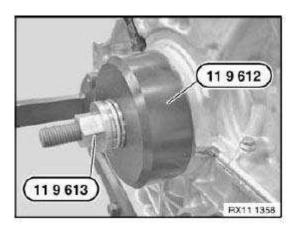


Fig. 73: Identifying Special Tool (11 9 612 And 11 9 613) Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

21 CRANKSHAFT WITH BEARING

11 21 500 REPLACING CRANKSHAFT (N12)

Special tools required:

- 00 9 120
- 11 4 471
- 11 4 472
- 11 6 251
- 11 6 252
- 23 1 240

WARNING: Rotating components (danger or injury!).
It is absolutely essential to follow the procedure described below and the instructions on handling the special tools.

IMPORTANT: Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove engine.
- Mount engine on assembly stand.
- Remove vibration damper.
- Removing oil pan.
- Remove oil pump.

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- Remove timing chain.
- Remove cylinder head.
- Remove flywheel.

Release screws (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Remove oil deflector (2).

Remove all pistons.

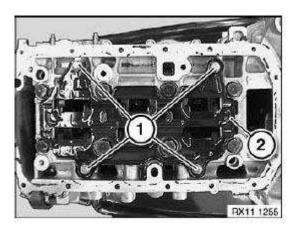
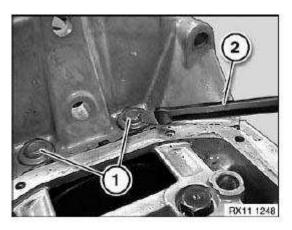


Fig. 74: Identifying Oil Deflector And Screws Courtesy of BMW OF NORTH AMERICA, INC.

Drive out cover plates (1) with a cross-chisel (2).

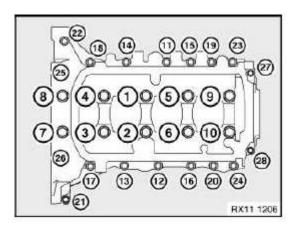


<u>Fig. 75: Identifying Cover Plates With Cross-Chisel</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (26 to 11).

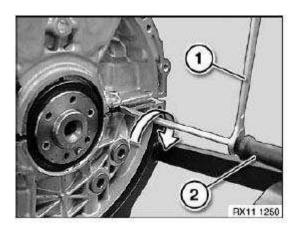
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Release screws (10 to 1).



<u>Fig. 76: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release crankcase lower half in direction of arrow with a regular screwdriver (2) and an open-end wrench (1).



<u>Fig. 77: Removing Crankcase</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove both radial shaft seals (1).

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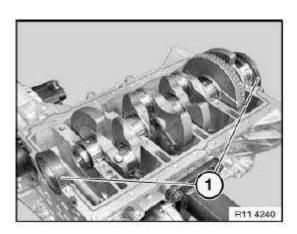


Fig. 78: Identifying Radial Shaft Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Remove crankshaft (1).

IMPORTANT: Remove crankshaft with aid of a second person. Weight of crankshaft approx. 19 kg.

Remove main bearing shells, replace if necessary.

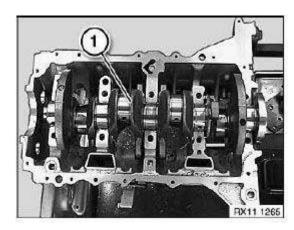
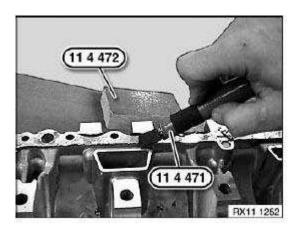


Fig. 79: Identifying Crankshaft Main Bearing Shells Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not clean sealing faces with a metal-cutting tool.

Clean sealing faces with special tools 11 4 471 and 11 4 472.

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<u>Fig. 80: Identifying Special Tools (11 4 471 And 11 4 472) On Sealing Faces</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (1) for damage and correct seating.

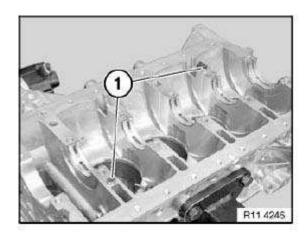
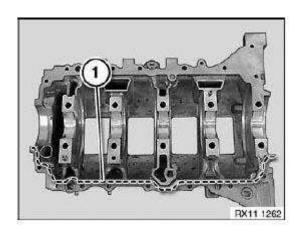


Fig. 81: Identifying Guide Sleeves Courtesy of BMW OF NORTH AMERICA, INC.

Apply sealing bead (1) to crankcase lower half.



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<u>Fig. 82: Identifying Crankcase Lower Half Sealing Bead</u> Courtesy of BMW OF NORTH AMERICA, INC.

Apply sealing bead (1) to crankcase upper half.

Apply a light coating of engine oil to bearings.

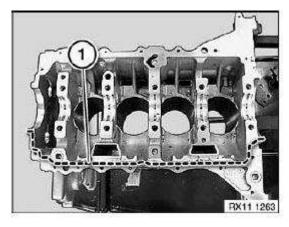
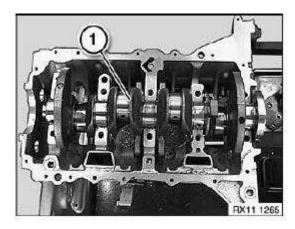


Fig. 83: Identifying Crankcase Upper Half Sealing Bead Courtesy of BMW OF NORTH AMERICA, INC.

Insert crankshaft (1).

IMPORTANT: Rotating component (danger of injury!)
Insert crankshaft with aid of a second person.
Weight of crankshaft approx. 19 kg.



<u>Fig. 84: Identifying Crankshaft Main Bearing Shells</u> Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate all bearings from 1 to 5 with engine oil.

Install crankcase lower half.

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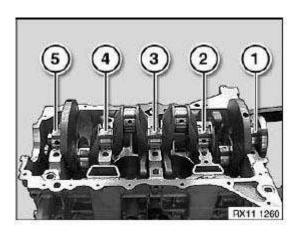


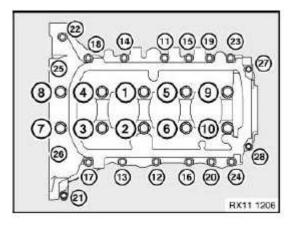
Fig. 85: Identifying Crankshaft Bearings
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bolts (1 to 10).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Tighten bolts (11 to 26).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

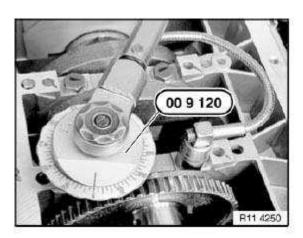


<u>Fig. 86: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bolts exclusively with special tool 00 9 120.

IMPORTANT: Jointing torque and angle of rotation must be observed without fail.

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<u>Fig. 87: Identifying Special Tool (00 9 120)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Apply a thin coating of Loctite 273 to cover sleeve (1) in area (2).

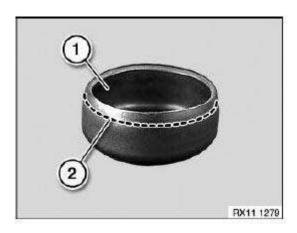
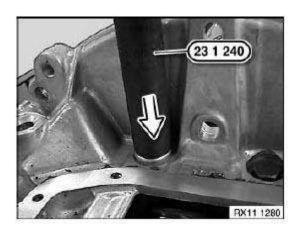


Fig. 88: Identifying Cover Sleeve Area Courtesy of BMW OF NORTH AMERICA, INC.

Drive cover sleeves firmly home with special tool 23 1 240.



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Fig. 89: Identifying Special Tool (23 1 240) On Cover Sleeves Courtesy of BMW OF NORTH AMERICA, INC.

Determine crankshaft axial clearance.

Attach special tool 11 6 252 with magnet.

Set special tool 11 6 251 to zero.

Press crankshaft in direction of rotation up to stop.

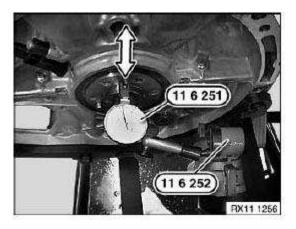


Fig. 90: Identifying Special Tool (11 6 252 And 11 6 251) On Crankshaft Courtesy of BMW OF NORTH AMERICA, INC.

Replace radial shaft seal at front.

Replace radial shaft seal at rear.

Assemble engine.

11 21 531 REPLACING ALL CRANKSHAFT MAIN BEARINGS (N12)

Special tools required:

• 11 4 470

IMPORTANT: Modified assignment of bearings.

Bearing (1) is at the output end (clutch end)

Determine main bearing colors; the designations on the crankcase and crankshaft are always required and can only determined using the table.

Necessary preliminary tasks:

• Remove crankshaft.

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Installation:

Bearing shell (1) with lubricant groove must be fitted in crankcase upper section.

Bearing shell (2) without lubricant groove must be fitted in crankcase lower section (bedplate).

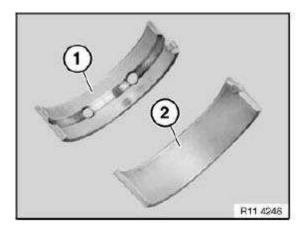


Fig. 91: Identifying Bearing Shell Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Modified assignment of bearings.

Bearing (1) is at the output end (clutch end)

Bearings (1 to 5).

Bearing (2) is a guide bearing.

IMPORTANT: Clean sealing surfaces.

Do not clean sealing faces with a metal-cutting tool.

Clean sealing faces with special tool 11 4 470 only.

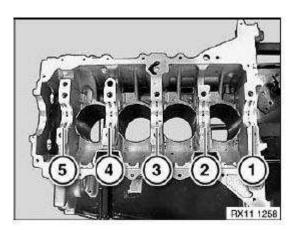


Fig. 92: Identifying Crankcase Bearing Groove

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Courtesy of BMW OF NORTH AMERICA, INC.

Insert guide rings (1) in crankcase at bearing block (2) with groove facing outwards.

If necessary, attach with engine oil to crankcase.

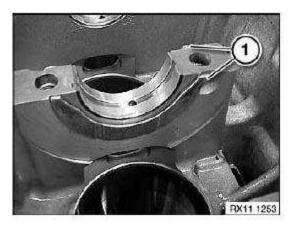


Fig. 93: Identifying Guide Rings Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Modified assignment of bearings.

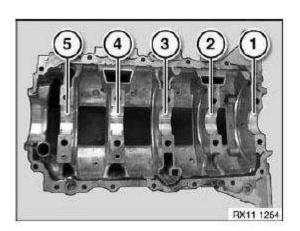
Bearing (1) is at the output end (clutch end)

Bearings (1 to 5).

IMPORTANT: Clean sealing surfaces.

Do not clean sealing faces with a metal-cutting tool.

Clean sealing faces with special tool 11 4 470 only.



<u>Fig. 94: Identifying Crankcase Bearing Groove</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Bearing classification on crankcase upper half:

Bearing allocation 1-5: the designations on the crankcase and crankshaft are always required.

Refer to the table for the color code.

Example:

Bearing 1. Letter P

Bearing 2. Letter K

Bearing 3. Letter I

Bearing 4. Letter N

Bearing 5. Letter N

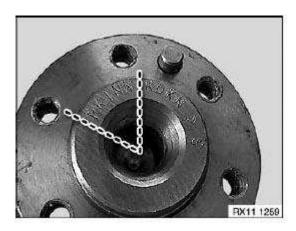


Fig. 95: Identifying Bearing Classification Color Code Courtesy of BMW OF NORTH AMERICA, INC.

Bearing classification on crankcase upper half:

Bearing allocation 1-5: the designations on the crankcase and crankshaft are always required.

Refer to the table for the color code.

Example:

Bearing 1. Letter T

Bearing 2. Letter Q

Bearing 3. Letter Q

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Bearing 4. Letter R

Bearing 5. Letter R



<u>Fig. 96: Identifying Bearing Classification Color Code</u> Courtesy of BMW OF NORTH AMERICA, INC.

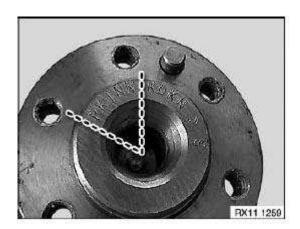
CRANKSHAFT BEARING COLOR CHART

Table overview of bearing classification: upper half Identifying letter of crankshaft																		
Bearings 1-5		A	В	C	d	E	G	H	I	K	M	N	P	Q	R	S	T	U
Crankcase	A	Gr	Gr	Gr	Gr	Gr	Sw	Bl	Bl	Bl	Bl							
	В	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Bl	Bl	Bl							
	C	Gr	Sw	Bl	Bl													
	D	Gr	Sw	Bl														
	E	Ge	Gr	Sw														
	G	Ge	Ge	Gr	Sw													
	Н	Ge	Ge	Ge	Gr	Sw	Sw	Sw	Sw	Sw	Sw							
	I	Ge	Ge	Ge	Ge	Gr	Sw	Sw	Sw	Sw	Sw							
	K	Ge	Ge	Ge	Ge	Ge	Gr	Sw	Sw	Sw	Sw							
	M	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Sw	Sw	Sw							
	N	Ge	Gr	Sw	Sw													
	P	Ge	Gr	Sw														
	Q	Or	Ge	Gr														
	R	Or	Or	Ge	Gr													
	S	Or	Or	Or	Ge	Gr	Gr	Gr	Gr	Gr	Gr							
	T	Or	Or	Or	Or	Ge	Gr	Gr	Gr	Gr	Gr							
	U	Or	Or	Or	Or	Or	Ge	Gr	Gr	Gr	Gr							
	X	Or	Or	Or	Or	Or	Or	Ge	Gr	Gr	Gr							
	Y	Or	Ge	Gr	Gr													
	\mathbf{Z}	Or	Ge	Gr														

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Crankshaft bearing colours: BL= Blue. SW= Black. Gr= Green. Ge Yellow. Or Orange.
Crankshaft bearing colors:
BL= Blue.
SW= Black.
Gr= Green.
Ge Yellow.
Or Orange.
Bearing classification on crankcase lower half:
Bearing allocation 1-5: the designations on the crankcase and crankshaft are always required.
Refer to the table for the color code.
Example:
Bearing 1. Letter P
Bearing 2. Letter K
Bearing 2. Letter K Bearing 3. Letter I

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<u>Fig. 97: Identifying Bearing Classification Color Code</u> Courtesy of BMW OF NORTH AMERICA, INC.

Bearing classification on crankcase lower half:

Bearing allocation 1-5: the designations on the crankcase and crankshaft are always required.

Refer to the table for the color code.

Example:

Bearing 1. Letter T

Bearing 2. Letter Q

Bearing 3. Letter Q

Bearing 4. Letter R

Bearing 5. Letter R

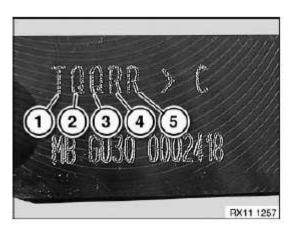


Fig. 98: Identifying Bearing Classification Color Code

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Courtesy of BMW OF NORTH AMERICA, INC.

CRANKSHAFT BEARING COLOR CHART

Table overview of bearing classification: lower half Crankshaft																		
Bearings 1-	A	В	C	d	E	G	Н	I	K	M	N	P	Q	R	S	T	U	
J	A	Gr	Sw	Bl														
	В	Gr	Gr	Sw	Bl													
	C	Gr	Gr	Gr	Sw	Bl	Bl	Bl	Bl	Bl	Bl							
	D	Gr	Gr	Gr	Gr	Sw	Bl	Bl	Bl	Bl	Bl							
	E	Gr	Gr	Gr	Gr	Gr	Sw	Bl	Bl	Bl	Bl							
	G	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Bl	Bl	Bl							
	H	Gr	Sw	B1	Bl													
	l	Gr	Sw	Bl														
	K	Ge	Gr	Sw														
Crankcase	M	Ge	Ge	Gr	Sw													
	N	Ge	Ge	Ge	Gr	Sw	Sw	Sw	Sw	Sw	Sw							
	P	Ge	Ge	Ge	Ge	Gr	Sw	Sw	Sw	Sw	Sw							
	Q	Ge	Ge	Ge	Ge	Ge	Gr	Sw	Sw	Sw	Sw							
	R	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Sw	Sw	Sw							
	S	Ge	Gr	Sw	Sw													
	T	Ge	Gr	Sw														
	U	Or	Ge	Gr														
	X	Or	Or	Ge	Gr													
	Y	Or	Or	Or	Ge	Gr	Gr	Gr	Gr	Gr	Gr							
Crankshaft bea	Z	Or	Or	Or	Or	Ge	Gr	Gr	Gr	Gr	Gr							

Crankshaft bearing colours:

BL= Blue.

SW= Black.

Gr= Green.

Ge Yellow.

Or Orange.

Example: Crankcase upper half:

Combining the dots of the designations of the crankshaft and crankcase produces the following color combinations.

Bearing 1: The letters (P and T) produce in the crankcase upper half the color Ge= Yellow with lubricant groove.

Bearing 2: K and Q= Ge= Yellow.

Bearing 3: I and Q= Ge= Yellow.

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Bearing 4: N and R= Gr= Green.

Bearing 5: N and R= Gr= Green.

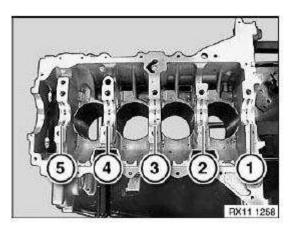


Fig. 99: Identifying Crankcase Bearing Groove Courtesy of BMW OF NORTH AMERICA, INC.

Example: Crankcase lower half:

Combining the dots of the designations of the crankcase and crankshaft produces the following color combinations.

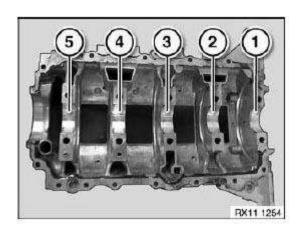
Bearing 1: The letters P. and T. produce in the crankcase lower half the color Gr= Green without lubricant groove.

Bearing 2: K and Q= Gr= Green.

Bearing 3: I and Q= Gr= Green.

Bearing 4: N and R= Gr= Green.

Bearing 5: N and R= Gr= Green.



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Fig. 100: Identifying Crankcase Bearing Groove Courtesy of BMW OF NORTH AMERICA, INC.

Install crankcase lower section.

Assemble engine.

11 22 500 REMOVING AND INSTALLING OR REPLACING FLYWHEEL (N12)

Special tools required:

• 11 9 590

Necessary preliminary tasks:

- Remove transmission.
- Remove clutch.

Lock flywheel with special tool 11 9 590.

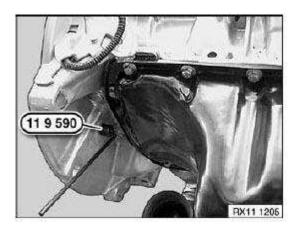


Fig. 101: Identifying Special Tool (11 9 590) On Crankshaft Courtesy of BMW OF NORTH AMERICA, INC.

Flywheel for automatic transmission.

Release flywheel bolts (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Installation:

Flywheel (1) is secured with an alignment pin.

Fit new flywheel screws.

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Clean crankshaft thread for flywheel screws.

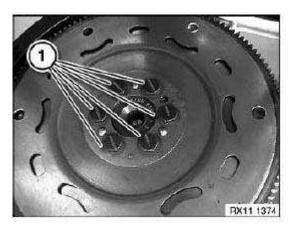


Fig. 102: Identifying Flywheel Bolts Courtesy of BMW OF NORTH AMERICA, INC.

Flywheel for manual gearbox.

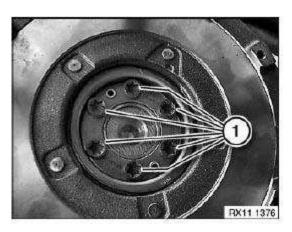
Flywheel with and without dual-mass: release bolts (1).

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 103: Identifying Flywheel Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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Sensor gear (1) is loose on crankshaft and is first secured to flywheel.

Dowel pin (2) for securing sensor gear/flywheel.

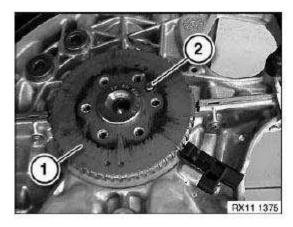


Fig. 104: Identifying Sensor Gear And Dowel Pin Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

22 FLYWHEEL

11 22 500 REMOVING AND INSTALLING OR REPLACING FLYWHEEL (N12)

Special tools required:

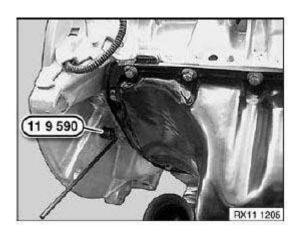
• 11 9 590

Necessary preliminary tasks:

- Remove transmission.
- Remove clutch.

Lock flywheel with special tool 11 9 590.

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<u>Fig. 105: Identifying Special Tool (11 9 590) On Crankshaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

Flywheel for automatic transmission.

Release flywheel bolts (1).

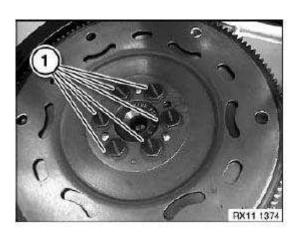
Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Installation:

Flywheel (1) is secured with an alignment pin.

Fit new flywheel screws.

Clean crankshaft thread for flywheel screws.



<u>Fig. 106: Identifying Flywheel Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Flywheel for manual gearbox.

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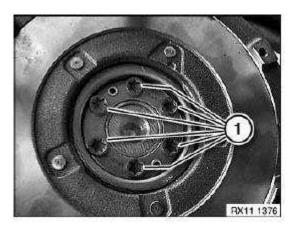
Flywheel with and without dual-mass: release bolts (1).

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

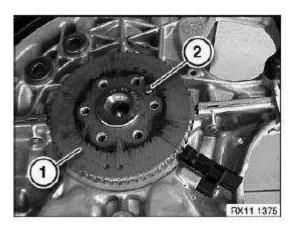


<u>Fig. 107: Identifying Flywheel Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Sensor gear (1) is loose on crankshaft and is first secured to flywheel.

Dowel pin (2) for securing sensor gear/flywheel.



<u>Fig. 108: Identifying Sensor Gear And Dowel Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Assemble engine.

23 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING OR REPLACING VIBRATION DAMPER (N12)

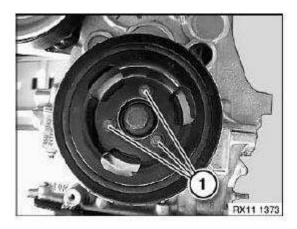
Necessary preliminary tasks:

• Remove drive belt

Release screws (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Remove vibration damper.



<u>Fig. 109: Identifying Vibration Damper Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

24 CONNECTING ROD WITH BEARING

11 24 571 REPLACING CONROD BEARINGS (N12)

IMPORTANT: Modified procedure; the bearing shell colors are the same at the top and bottom.

Necessary preliminary tasks:

• Remove all pistons.

Install new conrod bearing shells.

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Insert conrod bearing shells (1 and 2).

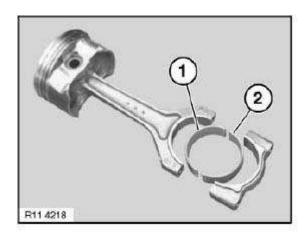


Fig. 110: Identifying Bearing Shells Courtesy of BMW OF NORTH AMERICA, INC.

Install all pistons with conrods.

Assemble engine.

25 PISTON WITH RINGS AND

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N12)

Special tools required:

- 00 9 120
- 11 9 620
- 11 9 670

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove engine.
- Mount engine on assembly stand.

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- Remove intake air manifold.
- Remove cylinder head.
- Remove engine oil sump.
- Remove oil pump.

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Illustrations show N46.



Fig. 111: Locating Cylinder Wall Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example N14:

Direction of arrow (1) points to camshaft drive.

Cylinder allocation (2) per cylinder.

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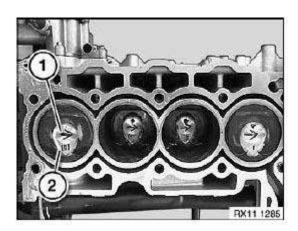


Fig. 112: Identifying Camshaft Points
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example:

Mark cylinder allocation (1) per cylinder.

Direction of arrow (2) points to camshaft drive.

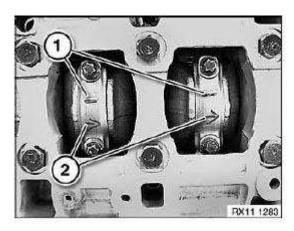


Fig. 113: Identifying Camshaft Bearing Positions Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Remove conrod bearing cap.

IMPORTANT: connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

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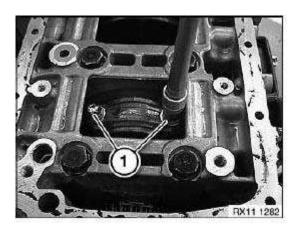


Fig. 114: Identifying Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9 620 in conrod big end.

Press out connecting rod and piston to cylinder head side.

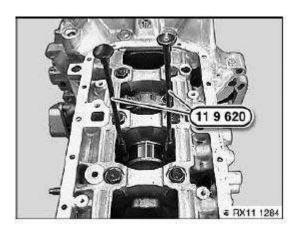


Fig. 115: Identifying Special Tool (11 9 620) Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Protective goggles must be worn for the next work step.

WARNING: Protective goggles must be worn.

IMPORTANT: Piston and gudgeon pins are paired and must not be fitted individually.

Lever out piston pin circlip with a screwdriver in direction of arrow.

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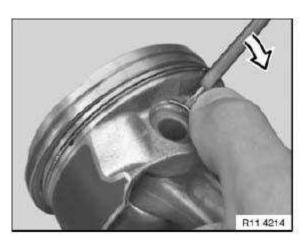
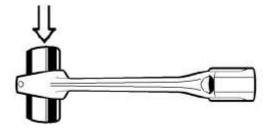


Fig. 116: Identifying Piston Pin Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

Installation:

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.



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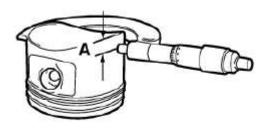
<u>Fig. 117: Identifying Gudgeon Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point A from bottom edge of piston and offset at 90° to the axis of the gudgeon pin.

Piston diameter at measuring point A.

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88 11 051 U

<u>Fig. 118: Identifying Piston Diameter</u> Courtesy of BMW OF NORTH AMERICA, INC.

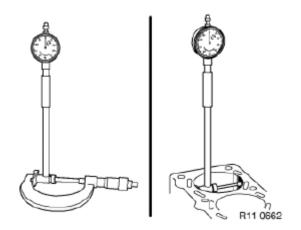
Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance.

If necessary, replace piston.



<u>Fig. 119: Identifying Cylinder Bore Diameter</u> Courtesy of BMW OF NORTH AMERICA, INC.

Install all piston rings.

Install all bearing shells.

Coat piston and piston rings with oil.

Pre-install piston in special tool 11 9 670.

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Screw special tool 11 9 620 into conrod.

Installation:

Check protective lugs on special tool 11 9 620 for correct position and damage.

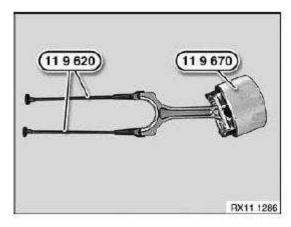


Fig. 120: Identifying Special Tool (11 9 620 And 11 9 670) Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston with connecting rod in cylinder.

IMPORTANT: Danger of piston ring failure. Press in piston with finger pressure only, do not drive in (see arrows).

Insert piston (1) so that arrow on piston crown points to camshaft drive.

If reusing the pistons, assign cylinder allocation (2) to correct cylinder.

Press in piston with special tool 11 9 670.

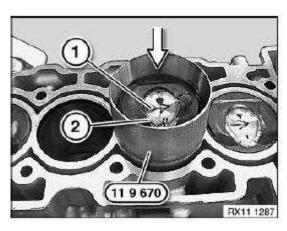


Fig. 121: Pressing Piston With Special Tool (11 9 670) Courtesy of BMW OF NORTH AMERICA, INC.

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IMPORTANT: Point of fracture (1) on conrod.

Conrod and conrod bearing cap are identified with pairing letters (2) and must not be mixed up.

Mixing them up or incorrectly fitting the conrod bearing cap on the big end will result in engine damage.

Both pairing letters (2) must be together on one side.

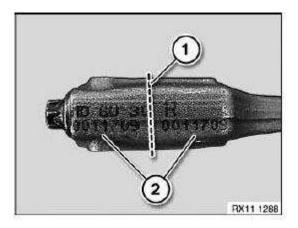


Fig. 122: Identifying Bearing Cap Pairing Letters Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crank pin.

Assemble connecting rod and crank pin.

Remove special tool 11 9 620.

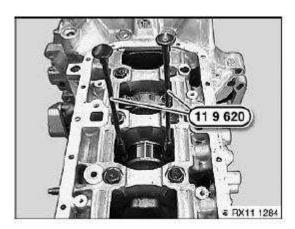


Fig. 123: Identifying Special Tool (11 9 620) Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

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Check cylinder identification markings (1).

Direction of arrow (2) points to camshaft drive.

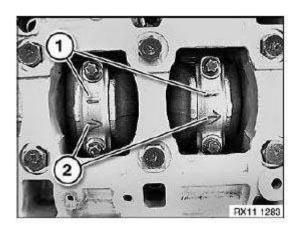


Fig. 124: Identifying Camshaft Bearing Positions Courtesy of BMW OF NORTH AMERICA, INC.

Install new connecting rod bolts (1).

Carry out torsion angle tightening of conrods with special tool $00\ 9\ 120$.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

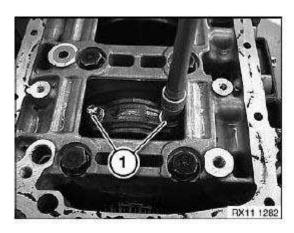


Fig. 125: Identifying Connecting Rod Bolts Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N12)

Special tools required:

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• 11 9 670

Necessary preliminary tasks:

• Remove all pistons.

Measuring axial clearance of piston rings in piston ring groove.

Technical Data.

NOTE: It is not possible to measure the axial clearance of the oil scraper rings.

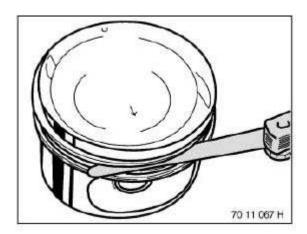


Fig. 126: Identifying Piston Rings Groove Clearance Courtesy of BMW OF NORTH AMERICA, INC.

Remove compression ring and stepped ring upwards with piston ring pliers.

Oil scraper ring comprises two steel band rings and a support spring.

NOTE: Oil scraper ring cannot be removed with piston ring pliers.

Put aside piston rings in correct sequence and installation position.

It might not be possible to find the identification on used piston rings.

Installation:

New pistons may only be installed together with new piston rings.

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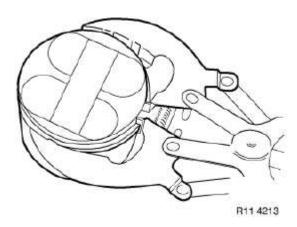


Fig. 127: Removing Piston Ring Courtesy of BMW OF NORTH AMERICA, INC.

Determine gap with a feeler gauge.

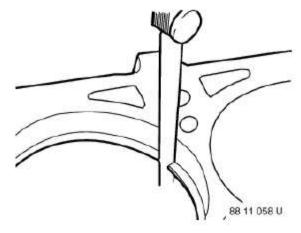


Fig. 128: Identifying Piston Ring Gap With Feeler Gauge Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Piston rings with "TOP" identification must point to piston crown.

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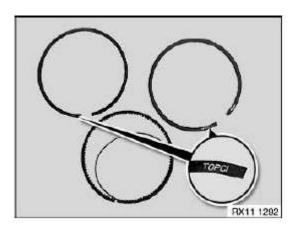


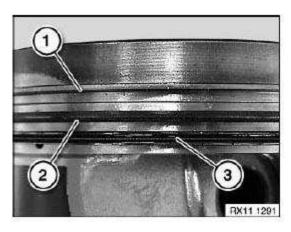
Fig. 129: Identifying Piston Rings With "TOP" Identification Point Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Piston rings with "TOP" identification must point to piston crown.

- 1. Plain compression ring
- 2. Taper face ring
- 3. Two-part oil scraper ring

IMPORTANT: Contact point on oil scraper ring (3) can overlap - risk of damage! - during installation in cylinder.



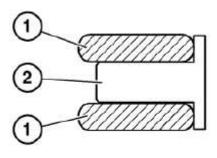
<u>Fig. 130: Identifying Compression Ring, Taper Face Ring And Two-Part Oil Scraper Ring</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The oil control ring comprises a steel band ring (1) and a support spring (2).

Installation:

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Insert support spring (2) in piston ring groove and then fit steel band ring (1) so that end faces point to each other.



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Fig. 131: Identifying Support Spring And Steel Band Ring Courtesy of BMW OF NORTH AMERICA, INC.

Offset the contact points (1) of the piston rings by approx. 120° to each other but do not position above the piston pin boss. Coat special tool 11 9 670 with sufficient engine oil. **Risk of damage** to piston rings!

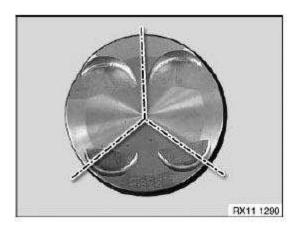


Fig. 132: Identifying Contact Points Of Piston Rings Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

28 V-RIBBED BELT WITH TENSIONER

11 28 010 REPLACING ALTERNATOR DRIVE BELT (N12)

Necessary preliminary tasks:

- Remove right wheel arch cover
- Remove right headlight
- Remove lock bridge

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Bring belt tensioner (1) with wrench (2) into assembly position.

Secure assembly position of belt tensioner (1) by sliding locating pin (3) in direction of arrow.

WARNING: Danger of injury!

Remove wrench (1) again from belt tensioner.

Remove drive belt (4) from alternator.

NOTE: For reasons of clarity, illustration and text show front wall removed.

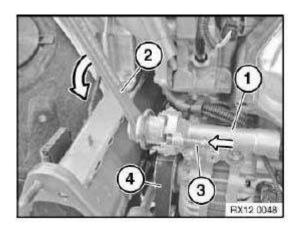
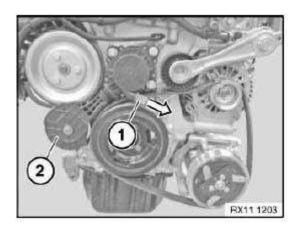


Fig. 133: Identifying Belt Tensioner Position And Sliding Pin Courtesy of BMW OF NORTH AMERICA, INC.

Move friction wheel (2) into servicing position.

In order to release the frictional connection between crankshaft and coolant pump, it is necessary to move the friction gear (2) into the servicing position.

Firmly pull handle (1) in direction of arrow until friction gear (2) is separated from belt pulley.



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Fig. 134: Pulling Handle Courtesy of BMW OF NORTH AMERICA, INC.

To secure friction gear in servicing position, suspend pull cable (1) on housing (2).

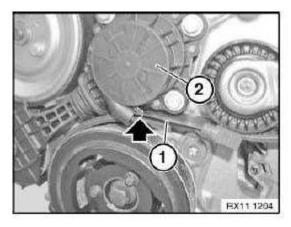


Fig. 135: Pulling Cable On Housing Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Check that drive belt for is in correct installation position - risk of damage.

11 28 012 REPLACING DRIVE BELT (WITHOUT A/C SYSTEM)

Special tools required:

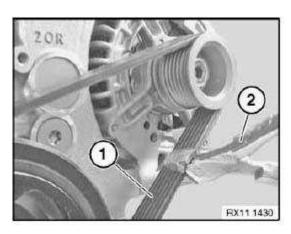
• 11 9 680

Necessary preliminary tasks:

• Remove right wheel arch line.

Cut through ribbed V-belt with a suitable tool (2).

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<u>Fig. 136: Identifying Ribbed V-Belt</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 680 on vibration damper (see arrow).

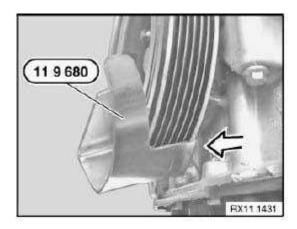
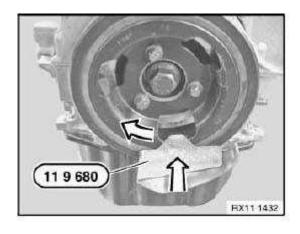


Fig. 137: Identifying Special Tool (11 9 680) On Vibration Damper Courtesy of BMW OF NORTH AMERICA, INC.

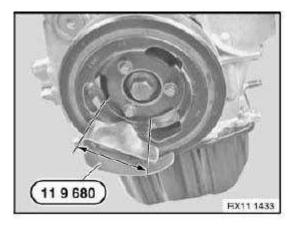
Attach special tool 11 9 680 in direction of arrow and slide further in direction of arrow.



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<u>Fig. 138: Identifying Special Tool (11 9 680) On Vibration Damper</u> Courtesy of BMW OF NORTH AMERICA, INC.

Move special tool 11 9 680 on vibration damper into assembly position.



<u>Fig. 139: Identifying Special Tool (11 9 680) On Vibration Damper</u> Courtesy of BMW OF NORTH AMERICA, INC.

Place ribbed V-belt (1) on alternator (2).

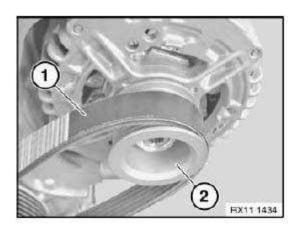


Fig. 140: Identifying Ribbed V-Belt On Alternator Courtesy of BMW OF NORTH AMERICA, INC.

Place ribbed V-belt (1) in direction of arrow on vibration damper.

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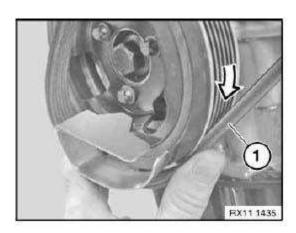


Fig. 141: Identifying Ribbed V-Belt In Vibration Damper Courtesy of BMW OF NORTH AMERICA, INC.

Turn vibration damper in direction of arrow.

Press ribbed V-belt (1) inwards by hand (see arrow).

IMPORTANT: Danger of injury!

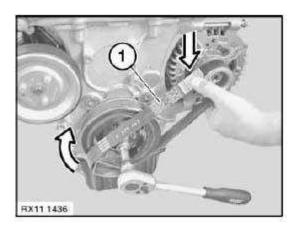


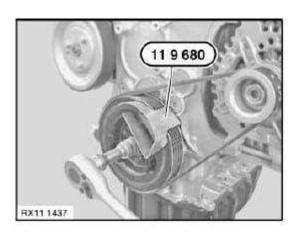
Fig. 142: Identifying Ribbed V-Belt Courtesy of BMW OF NORTH AMERICA, INC.

Turn vibration damper until drive belt on alternator and on vibration damper has fully jumped.

Remove special tool 11 9 680 from vibration damper.

Check correct seating of drive belt.

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<u>Fig. 143: Identifying Special Tool (11 9 680) From Vibration Damper</u> Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N12)

WARNING: Tensioning device subject to spring bias (danger of injury!) .

Necessary preliminary tasks:

- Bring front panel into service position.
- Disconnect lambda oxygen sensor cable.

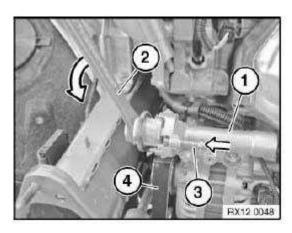
Pretension tensioning device (1) with tool (2) in direction of arrow.

Press in locking pin (3) in direction of arrow and hold.

Slowly release tool (2) and secure in position.

NOTE: Locking pin (3) holds tensioning device (1) at pretension.

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<u>Fig. 144: Identifying Belt Tensioner Position And Sliding Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Remove tensioning device (3).

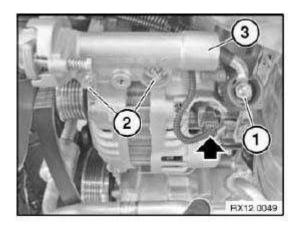


Fig. 145: Identifying Tensioning Device Courtesy of BMW OF NORTH AMERICA, INC.

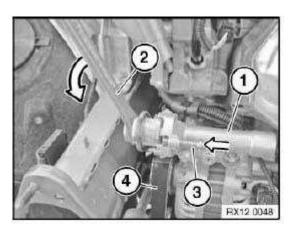
Installation:

Lever tensioning device (1) with tool (2) in direction of arrow.

Locking pin (3) is pretensioned with a spring and is automatically relieved during unlocking.

Ensure drive belt is in correct installation position.

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<u>Fig. 146: Identifying Belt Tensioner Position And Sliding Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 28 035 REMOVING AND INSTALLING/REPLACING FRICTION GEAR (N12)

Special tools required:

- 11 9 581
- 11 9 583

Necessary preliminary tasks:

• Remove right wheel arch cover

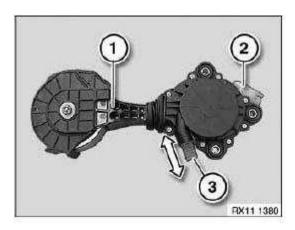
Pull out friction gear with mechanical release (3) in direction of arrow and lock on locking hook.

Friction gear (1) lifts mechanically off belt drive.

Disconnect plug connection (2) on friction gear.

NOTE: Picture shows friction gear removed.

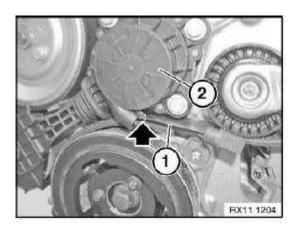
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<u>Fig. 147: Pulling Friction Gear</u> Courtesy of BMW OF NORTH AMERICA, INC.

Move friction gear (2) into servicing position.

To secure friction gear in servicing position, suspend pull cable (1) on housing (2).



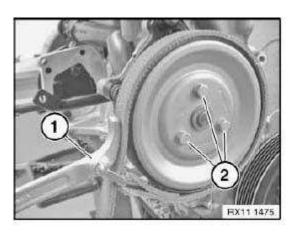
<u>Fig. 148: Pulling Cable On Housing</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure belt pulley of water pump with an oil filter band (1).

Release bolts (2) with special tools $11\ 9\ 581$ and $11\ 9\ 583$.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

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<u>Fig. 149: Identifying Oil Filter Band And Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) with special tools 11 9 583 and 11 9 581.

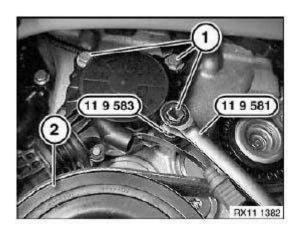


Fig. 150: Identifying Special Tools (11 9 583 And 11 9 581) On Bolts Courtesy of BMW OF NORTH AMERICA, INC.

Remove friction gear (1) towards bottom.

Disconnect plug connection (2).

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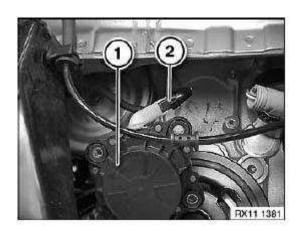


Fig. 151: Identifying Friction Gear And Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Check cable routing for correct installation position - risk of damage.

Check function of DME.

31 CAMSHAFT

11 31 005 CHECKING CAMSHAFT TIMING

Special tools required:

- 11 9 540
- 11 9 590

IMPORTANT: Modified procedure for timing adjustment.

The timing is not determined at firing TDC of cylinder no. 1.

All pistons are in the 90° position. Check locking of adjustment units.

Necessary preliminary tasks:

- Remove cylinder head cover.
- Remove front splash guard.

IMPORTANT: Danger of mixing up special tool bore.

Balance hole and special tool bore can be mixed up; all pistons must be in the 90° position.

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If necessary, determine by means of spark plug bore.

Rotate crankshaft at central bolt.

Position crankshaft with special tool 11 9 590.

Do not remove special tool 11 9 590 during repair work.

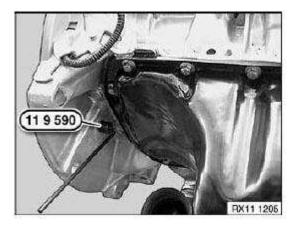


Fig. 152: Identifying Special Tool (11 9 590) On Crankshaft Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check locking on VANOS adjustment units.

Attempt to rotate camshaft in direction of rotation at hexagon head.

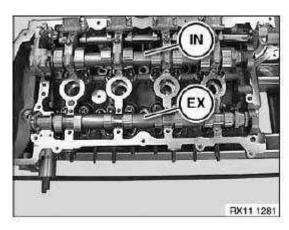
The adjustment units are locked in the initial position when the camshafts are non-positively connected to the adjustment units.

If no fixed connection to the camshaft can be established, the adjustment unit is faulty and must be replaced.

Both camshafts are in the correct installation position when the designation (IN) for inlet camshaft points upwards.

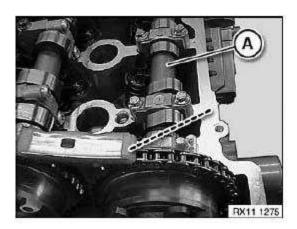
In the case of the exhaust camshaft, the designation EX must point upwards.

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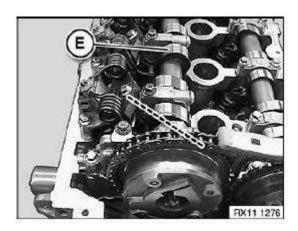
<u>Fig. 153: Identifying (IN And EX) Camshaft Installation Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position of exhaust camshaft (A) points at an angle to the right in an upper outward direction



<u>Fig. 154: Identifying Exhaust Camshaft Right In Upper Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position of inlet camshaft (E) points at an angle to the left in an upper outward direction



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<u>Fig. 155: Identifying Inlet Camshaft Left In Upper Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 540 (exhaust) on direction of exhaust camshaft and secure with a bolt (1).

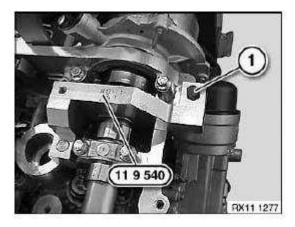


Fig. 156: Identifying Special Tool (11 9 540) On Exhaust Camshaft Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 540 (inlet) on direction of inlet camshaft and secure with a bolts (1 and 2).

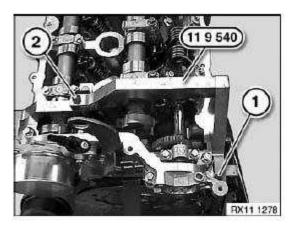


Fig. 157: Identifying Special Tool (11 9 540) On Inlet Camshaft Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust valve timing.

Assemble engine.

11 31 025 REMOVING AND INSTALLING/REPLACING INLET CAMSHAFT (N12)

Special tools required:

• 11 4 481

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• 11 9 551

Necessary preliminary tasks:

- Remove cylinder head cover.
- Remove adjusting unit for inlet camshaft.
- Remove intermediate lever.
- Remove exhaust camshaft.

IMPORTANT: The screws of the bearing bridge must not be opened.

Releasing the bearing bridge will result in damage to the cylinder head.

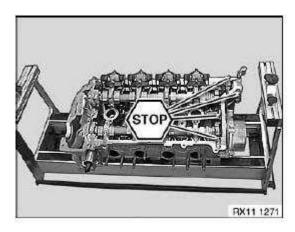


Fig. 158: Identifying Camshaft Stop Courtesy of BMW OF NORTH AMERICA, INC.

Bearing cap (1) marked 5 is a thrust bearing.

Release screws of bearing caps (1 to 5).

Set all bearing caps down in special tool 11 4 481 in a tidy and orderly fashion.

Remove camshaft (6).

Installation:

Clean all bearing points and lubricate with oil.

Check plain compression rings for damage.

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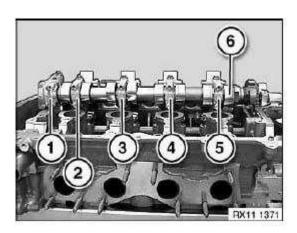


Fig. 159: Identifying Bearing Caps Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace plain compression rings (1).

The plain compression rings have catches at the joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

IMPORTANT: Plain compression rings (1) can easily break.

Make sure plain compression rings (1) can move freely.

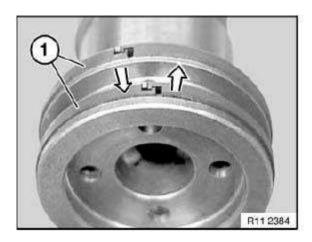


Fig. 160: Identifying Plain Compression Rings Courtesy of BMW OF NORTH AMERICA, INC.

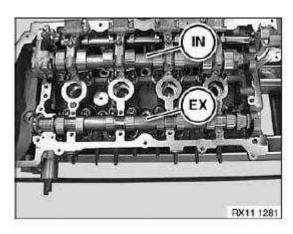
IMPORTANT: Both camshafts have different identifications.

Mixing up the two camshafts will result in engine damage.

EX Exhaust camshaft.

IN Inlet camshaft.

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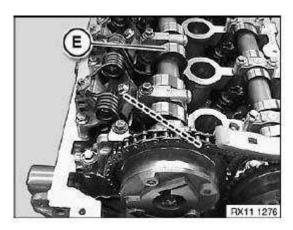
<u>Fig. 161: Identifying (IN And EX) Camshaft Installation Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Insert camshaft (E) so that IN marking points upwards.

Position inlet camshaft (E) so that cams point upwards at an angle.

Attach special tool 11 9 551 to twin surface.

Make sure plain compression rings cable can move freely.

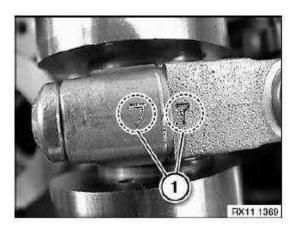


<u>Fig. 162: Identifying Inlet Camshaft Left In Upper Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

All bearing caps are identified from 5 to 10.

Pay attention to pairing letters (1).

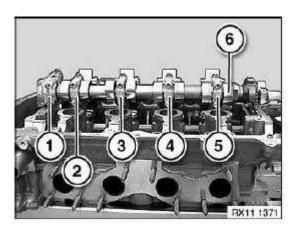
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<u>Fig. 163: Identifying Pairing Letters</u> Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bearing caps from inside outwards.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 164: Identifying Bearing Caps</u> Courtesy of BMW OF NORTH AMERICA, INC.

Adjust valve timing.

Assemble engine.

11 31 028 REMOVING AND INSTALLING/REPLACING EXHAUST CAMSHAFT (N12)

Special tools required:

- 11 4 480
- 11 9 000
- 11 9 590
- 11 9 650

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• 11 9 652

IMPORTANT: It is absolutely essential to follow an exact procedure for removing and

installing the exhaust camshaft.

Modified procedure for timing adjustment.

All pistons are in the 90° position.

Risk of damage!

Necessary preliminary tasks:

- Remove cylinder head cover.
- Remove vacuum pump.
- Remove exhaust adjusting unit for exhaust camshaft.
- Release central bolt of inlet adjustment unit.

IMPORTANT: The screws of the bearing bridge must not be opened.

Releasing the bearing bridge will result in damage to the cylinder head.

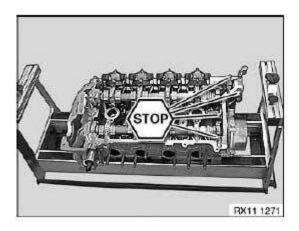


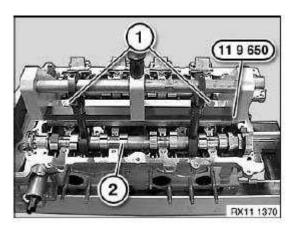
Fig. 165: Identifying Camshaft Stop Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to spark plug bores.

Check special tool 11 9 652 for damage.

Secure special tool 11 9 650 on cylinder head with screws 1 in spark plug holes.

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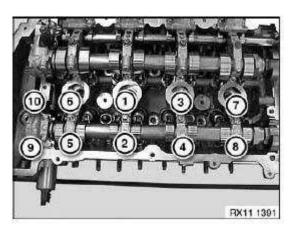


<u>Fig. 166: Identifying Special Tool (11 9 650) On Cylinder Head</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Release bearing caps with special tool 11 9 650 only. Shown without special tools for purposes of clarity.

Release bearing cap screws from 10 to 1.

Set all bearing caps down in special tool 11 4 480 in a tidy and orderly fashion.



<u>Fig. 167: Identifying Bearing Cap Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

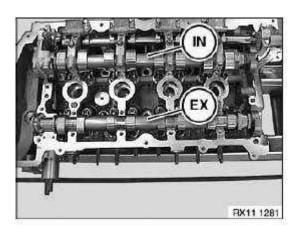
IMPORTANT: Both camshafts have different identifications.

Mixing up the two camshafts will result in engine damage.

EX Exhaust camshaft.

IN Inlet camshaft.

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<u>Fig. 168: Identifying (IN And EX) Camshaft Installation Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check plain compression rings (1) for damage and replace if necessary.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

IMPORTANT: Plain compression rings (1) can easily break.

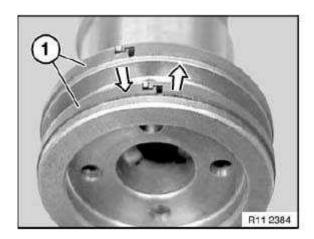


Fig. 169: Identifying Plain Compression Rings Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine:

Block engine with special tool 11 9 590.

Removed cylinder head:

When using special tool $11\ 9\ 000$, it will be necessary to remove the aluminum profile insert.

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Installation:

Before installing exhaust camshaft, make sure roller rocker arm is correctly seated HVCA element and valve.

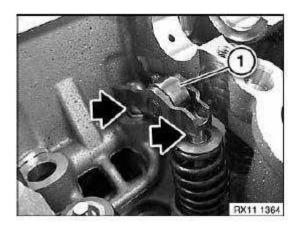


Fig. 170: Identifying Roller Rocker Arm Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lubricate all bearing points with engine oil.

Insert camshaft (1).

Pay attention to installation position (2).

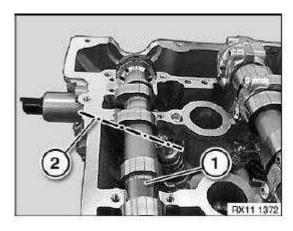


Fig. 171: Identifying Camshaft Installation Position Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Both camshafts have different identifications.

Mixing up the two camshafts will result in engine damage.

EX Exhaust camshaft. IN Inlet camshaft.

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Designation (EX) on exhaust camshaft points upwards.

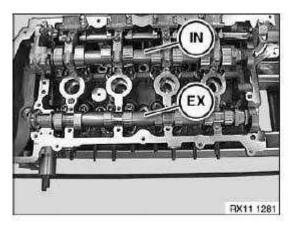
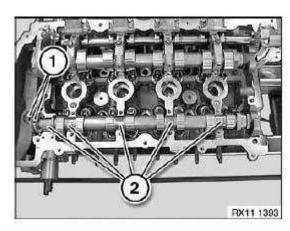


Fig. 172: Identifying (IN And EX) Camshaft Installation Position Courtesy of BMW OF NORTH AMERICA, INC.

Make sure plain compression rings (1) can move freely.

Align plain compressing rings (1) in downward direction.

Lubricate all bearing points (2) with engine oil.



<u>Fig. 173: Identifying Plain Compression Rings And Bearing Lubricating Points</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 9 650 on cylinder head with screws 1 in spark plug holes.

Pretension camshaft (2).

Fit and secure bearing bridges.

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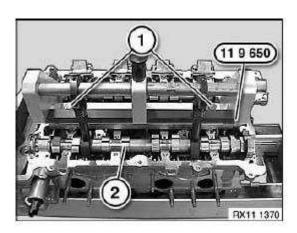


Fig. 174: Identifying Special Tool (11 9 650) On Cylinder Head Courtesy of BMW OF NORTH AMERICA, INC.

Bearing bridges, allocation of exhaust camshaft from (0 to 4).

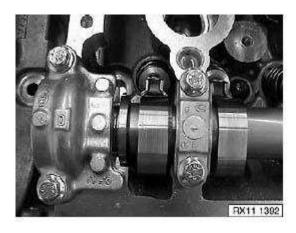


Fig. 175: Identifying Exhaust Camshaft Courtesy of BMW OF NORTH AMERICA, INC.

Fit all bearing bridges from 0 to 4.

Secure screws in sequence (1 to 10).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

NOTE: Shown without special tool 11 9 650 for purposes of clarity.

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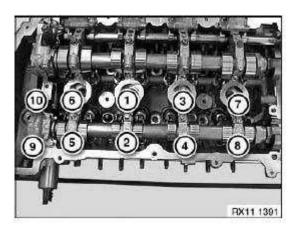


Fig. 176: Identifying Bearing Cap Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust valve timing.

Assemble engine.

11 31 051 REPLACING TIMING CHAIN (N14)

Special tools required:

- 00 9 120
- 11 9 280
- 11 9 540
- 11 9 590

IMPORTANT: Modified procedure for timing adjustment.

The timing is not determined at firing TDC of cylinder no. 1.

All pistons are in the 90° position.

Necessary preliminary tasks:

- Remove cylinder head cover.
- Remove all spark plugs.
- Remove vibration damper.
- Remove chain tensioner.
- Remove both VANOS adjustment units.
- Remove PTFE ring at front.
- Remove belt tensioner.

Position crankshaft with special tool 11 9 590.

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Do not remove special tool 11 9 590 during repair work.

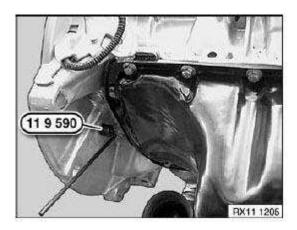
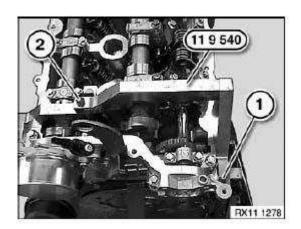


Fig. 177: Identifying Special Tool (11 9 590) On Crankshaft Courtesy of BMW OF NORTH AMERICA, INC.

Do not remove special tool 11 9 540.

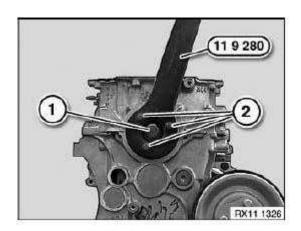


<u>Fig. 178: Identifying Special Tool (11 9 540) On Inlet Camshaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Employ a second person for gripping when releasing central bolt (1).

Fit special tool 11 9 280 on hub for vibration damper with screws (2).

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<u>Fig. 179: Identifying Special Tool (11 9 280) On Hub Into Vibration Damper</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt in direction of arrow.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

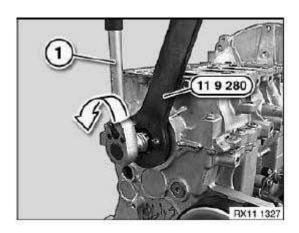


Fig. 180: Tightening Central Bolt Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pins (1 and 2).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

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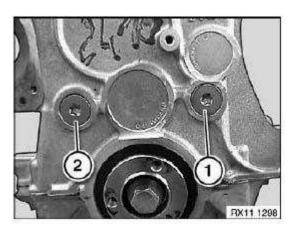
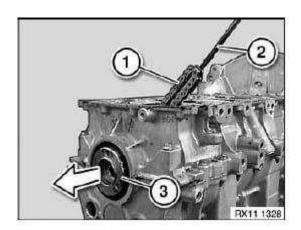


Fig. 181: Identifying Bearing Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Remove hub (3) towards front.

Remove chain module with timing chain.

Using a hook (2), pull oil pump chain (1) upwards.



<u>Fig. 182: Identifying Chain Module With Timing Chain</u> Courtesy of BMW OF NORTH AMERICA, INC.

Sprocket wheel (1) of timing chain.

Sprocket wheel (2) of oil pump.

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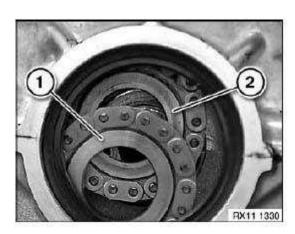


Fig. 183: Identifying Sprocket Wheel With Timing Chain Courtesy of BMW OF NORTH AMERICA, INC.

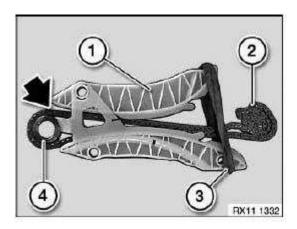
Secure chain module (1) with rubber (3) to facilitate assembly.

Pull timing chain (2) upwards until sprocket wheel (4) rests against chain guide (1).

Install timing chain (2) and sprocket wheel (4) in this position.

Installation:

Always keep timing chain (2) tensioned; it is possible for timing chain (2) to jam on chain module (1).



<u>Fig. 184: Identifying Timing Chain And Sprocket Wheel Installation Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation position of both sprocket wheels.

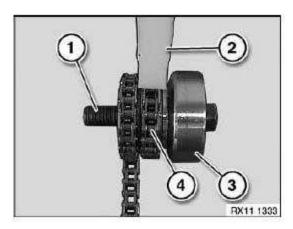
Sprocket wheel (1) of oil pump.

Guide rail (2) of timing chain.

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Hub (3) on crankshaft.

Sprocket wheel (4) of timing chain.



<u>Fig. 185: Identifying Sprocket Wheels Installation Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Attach oil pump sprocket wheel (2) in direction of arrow to crankshaft (1).

Insert chain module with timing chain and secure.

Attach crankshaft hub.

Screw in central bolt.

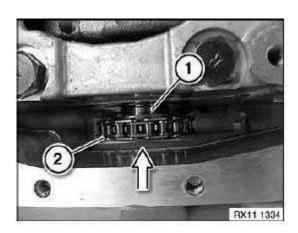


Fig. 186: Identifying Oil Pump Sprocket Wheel And Crankshaft Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 280 from hub.

Secure central bolt with special tool 00 9 120.

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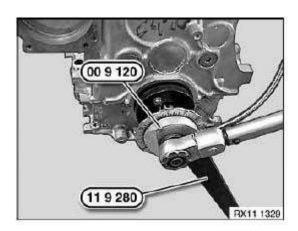


Fig. 187: Identifying Special Tool (11 9 280) From Hub Courtesy of BMW OF NORTH AMERICA, INC.

Install VANOS adjustment units.

Crank engine twice.

Check timing.

Install PTFE ring.

Assemble engine.

11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N12)

Necessary preliminary tasks:

• Remove throttle valves.

Release chain tensioner (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

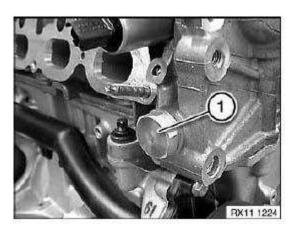
IMPORTANT: Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.

Make sure no oil runs onto the belt drive.

Installation:

Replace sealing ring.

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<u>Fig. 188: Identifying Chain Tensioner</u> Courtesy of BMW OF NORTH AMERICA, INC.

If the chain tensioner is reused, its oil chamber must be drained. Place chain tensioner on a level working surface and slowly compress.

Repeat procedure twice.



Fig. 189: Placing Chain Tensioner On Level Working Surface Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 505 ADJUSTING CAMSHAFT TIMING (N12)

Special tools required:

- 00 9 120
- 00 9 250
- 11 9 340
- 11 9 450

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- 11 9 540
- 11 9 590
- 32 2 100

IMPORTANT: Modified procedure for timing adjustment.

The timing is not determined at firing TDC of cylinder no. 1.

All pistons are in the 90° position. Check locking of adjustment units.

To open the central bolt at the camshaft, grip hexagon on rear of camshaft.

Risk of damage!

Necessary preliminary tasks:

• Remove cylinder head cover.

• Check timing.

IMPORTANT: Danger of mixing up special tool bore.

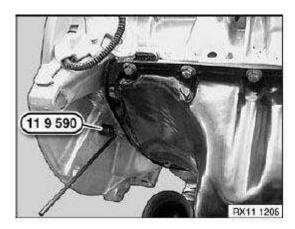
Balance hole and special tool bore can be mixed up; all pistons must be in the

90° position.

If necessary, determine by means of spark plug bore.

Rotate crankshaft at central bolt.

Slide in special tool 11 9 590 in direction of arrow and block crankshaft.



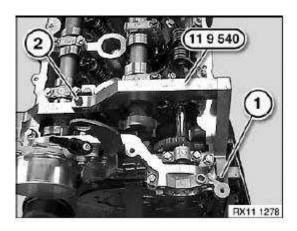
<u>Fig. 190: Identifying Special Tool (11 9 590) On Crankshaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

To open central bolt, mount special tool 11 9 540 on camshaft.

If the setting gauges cannot be positioned, grip the camshaft with an open-end wrench to release the central bolt.

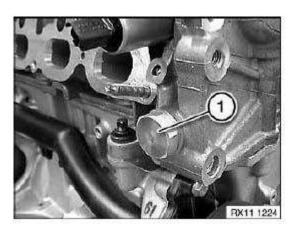
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<u>Fig. 191: Identifying Special Tool (11 9 540) On Inlet Camshaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release chain tensioner (have a cleaning cloth ready).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



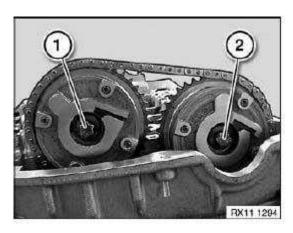
<u>Fig. 192: Identifying Chain Tensioner</u> Courtesy of BMW OF NORTH AMERICA, INC.

To open central bolts (1 and 2), mount special tool 11 9 540 on camshafts.

Release central bolts (1 and 2).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

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<u>Fig. 193: Identifying Central Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

The designations for the inlet camshaft (IN) and exhaust camshaft (EX) point upwards.

Both camshafts (inlet and exhaust) have three machined surfaces to enable special tool 11 9 450 to be mounted.

The fourth surface is not machined and is crescent-shaped - it must point downwards.

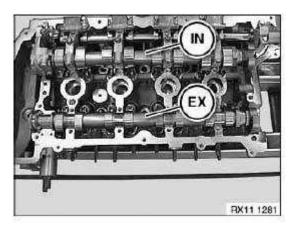
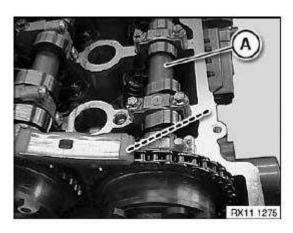


Fig. 194: Identifying (IN And EX) Camshaft Installation Position Courtesy of BMW OF NORTH AMERICA, INC.

Position of exhaust camshaft (EX) points at an angle to the right in an upper outward direction.

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<u>Fig. 195: Identifying Exhaust Camshaft Right In Upper Position</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position of inlet camshaft (E) points at an angle to the left in an upper outward direction.

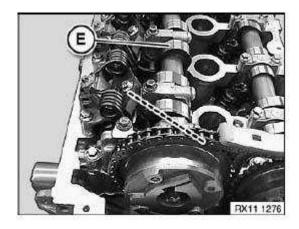
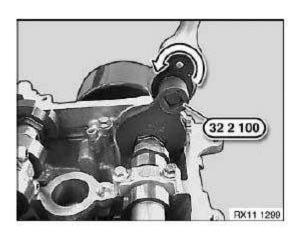


Fig. 196: Identifying Inlet Camshaft Left In Upper Position Courtesy of BMW OF NORTH AMERICA, INC.

Rotate exhaust camshaft with special tool 32 2 100 in direction of arrow.



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Fig. 197: Identifying Special Tool (32 2 100) On Exhaust Camshaft Courtesy of BMW OF NORTH AMERICA, INC.

Pretension camshaft with special tool 32 2 100.

Attach special tool 11 9 540 (exhaust side) to direction and secure with bolt (1).

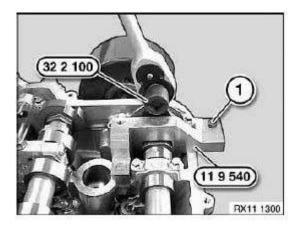


Fig. 198: Identifying Special Tool (32 2 100 And 11 9 540) Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9 540 (inlet side) to direction and secure with bolts (1 and 2).

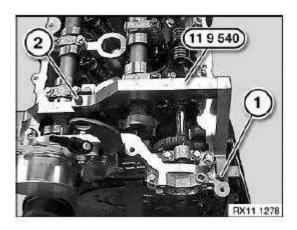
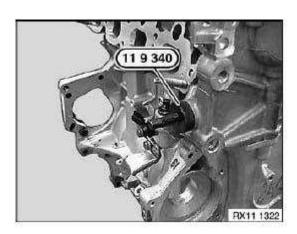


Fig. 199: Identifying Special Tool (11 9 540) On Inlet Camshaft Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 340 into cylinder head.

Pretension timing chain with special tool 00 9 250 to $0.6\ Nm$.

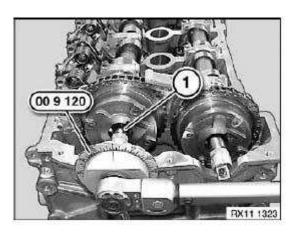
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<u>Fig. 200: Identifying Special Tool (11 9 340) Into Cylinder Head</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) with special tool 00 9 120 or an electronic torque wrench.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

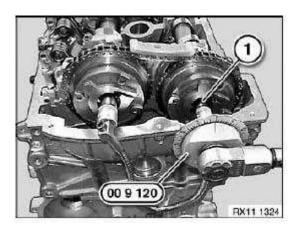


<u>Fig. 201: Identifying Special Tool (00 9 120) On Central Bolt</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) with special tool $00\ 9\ 120$ or an electronic torque wrench.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

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<u>Fig. 202: Identifying Special Tool (00 9 120) On Central Bolt</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

33 ROCKER ARM WITH BEARING

11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N12)

Special tools required:

• 11 4 480

Necessary preliminary tasks:

- Remove cylinder head cover.
- Remove intermediate lever.
- Remove exhaust camshaft.

IMPORTANT: Rocker arms (1) are divided into bearing categories.

The tolerance classes are designated as illustrated with numbers from 1 to 5.

Already used rocker arms (1) may only be reused in the same position.

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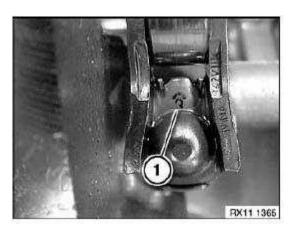


Fig. 203: Identifying Rocker Arms
Courtesy of BMW OF NORTH AMERICA, INC.

Remove HVCA element in direction of arrow.

Installation:

If the HVCA elements are to be reused, set them down in special tool 11 4 480 in a tidy and orderly fashion with the roller cam followers.

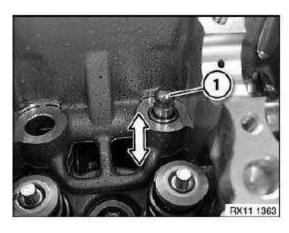


Fig. 204: Identifying HVCA Element Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) are divided into bearing categories.

The tolerance classes are designated as illustrated with numbers from 1 to 5.

Already used rocker arms (1) may only be reused in the same position.

Detach roller cam followers (1) from HVCA element and remove.

Set all roller cam followers down in special tool 11 4 480 in a tidy and orderly fashion.

Installation:

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Before installing exhaust camshaft and intermediate lever, make sure roller cam followers are correctly seated (see arrows).

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

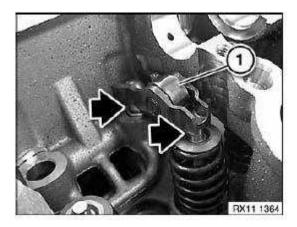


Fig. 205: Identifying Roller Rocker Arm Courtesy of BMW OF NORTH AMERICA, INC.

34 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N12)

Special tools required:

• 11 4 480

Necessary preliminary tasks:

- Remove cylinder head.
- Remove intermediate lever.
- Remove eccentric shaft.
- Remove inlet camshaft.
- Remove exhaust camshaft.
- Remove roller cam follower.
- Remove valve springs.
- Remove valve stem seals.

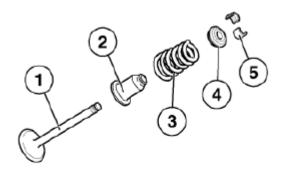
Arrangement:

- 1. Valve
- 2. Valve stem seal with spring plate, bottom

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- 3. Valve spring
- 4. Top plate spring
- 5. Valve tapers

If the valves are to be reused, set then down in special tool 11 4 480 in a tidy and orderly fashion.



R11 4170

Fig. 206: Identifying Valves Components Arrangement Sequence Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

11 34 560 REPLACING ALL VALVE STEM SEALS (N52)

Special tools required:

- 11 1 480
- 11 6 380

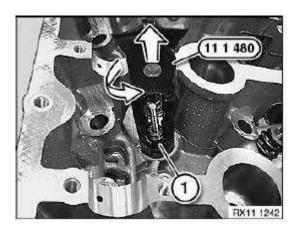
Necessary preliminary tasks:

- Remove cylinder head.
- Remove intermediate lever.
- Remove eccentric shaft
- Remove inlet camshaft.
- Remove exhaust camshaft.
- Remove roller cam follower.

Firmly press special tool 11 1 480 onto old valve stem seals (1).

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool 11 1 480.

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<u>Fig. 207: Identifying Special Tool (11 1 480) Onto Old Valve Stem Seals</u> Courtesy of BMW OF NORTH AMERICA, INC.

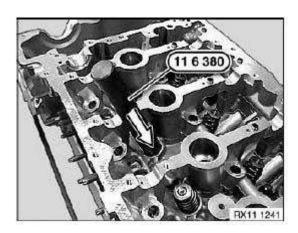
Installation:

Insert all valves.

Fit the mounting sleeves (plastic sleeves) supplied in the spare part on the valve stem end

Lubricate mounting sleeve.

Press on valve stem seal by hand with special tool 11 6 380 as far as it will go.



<u>Fig. 208: Identifying Special Tool (11 6 380) On Valve Stem Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 34 715 REPLACING ALL VALVE SPRINGS (N12)

Special tools required:

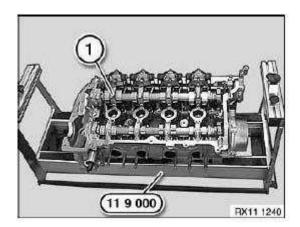
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- 11 4 480
- 11 9 000
- 11 9 006
- 11 9 007
- 11 9 017

Necessary preliminary tasks:

- Remove cylinder head.
- Remove exhaust camshaft.
- Remove intermediate lever.
- Remove inlet camshaft.
- Remove roller cam follower.

Place cylinder head (1) on special tool 11 9 000.



<u>Fig. 209: Identifying Cylinder Head On Special Tool (11 9 000)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 9 007 on special tool 11 9 006.

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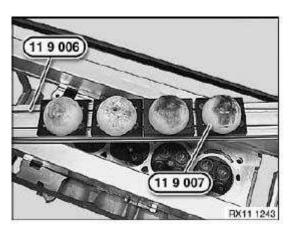


Fig. 210: Identifying Special Tool (11 9 006 And 11 9 007) Courtesy of BMW OF NORTH AMERICA, INC.

Align special tool 11 9 006.

Lock eccentrics (1) on special tool 11 9 000 in direction of arrow.

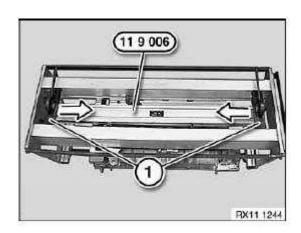
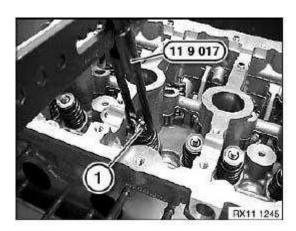


Fig. 211: Identifying Special Tool (11 9 006)
Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring and spring retainer (1) with special tool $11\ 9\ 017$.

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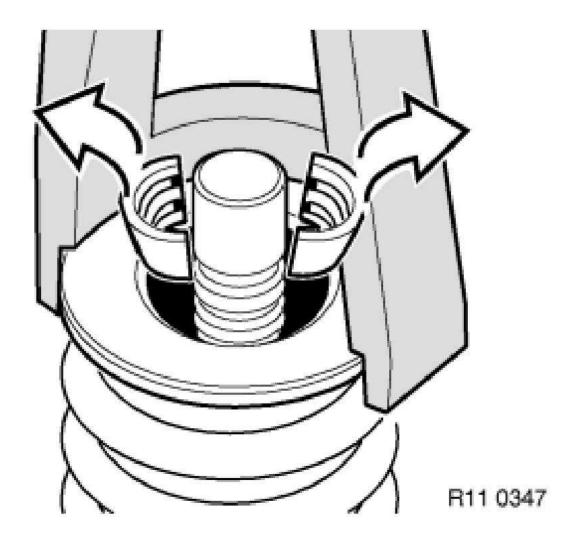
<u>Fig. 212: Identifying Special Tool (11 9 017) On Spring Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve tapers with a magnet.

Remove valve spring and spring retainer.

Set down on special tool 11 4 480 in a tidy and orderly fashion.

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<u>Fig. 213: Removing Valve Spring And Spring Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

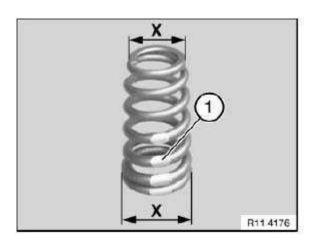
IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter pointing to the spring retainer at the bottom is required for correct installation of the valve spring.

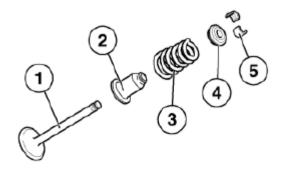
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<u>Fig. 214: Identifying Valve Spring Diameter</u> Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

- 1. Valve
- 2. Valve stem seal with spring plate, bottom
- 3. Valve spring
- 4. Top plate spring
- 5. Valve tapers



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Fig. 215: Identifying Valves Components Arrangement Sequence Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

36 VARIABLE CAMSHAFT TIMING

11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N12)

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Special tools required:

- 00 9 120
- 11 9 340
- 11 9 540
- 11 9 590

IMPORTANT: Always release both central bolts to adjust the timing. The timing is not determined at firing TDC of cylinder no. 1.

Modified procedure for timing adjustment.

All pistons are in the 90° position.

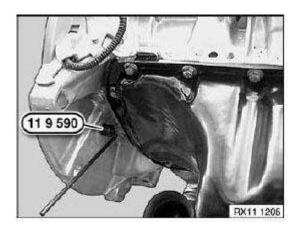
Check locking of adjustment units.

Necessary preliminary tasks:

- Remove cylinder head cover.
- Check timing.

Rotate crankshaft at central bolt.

Slide in special tool 11 9 590 in direction of arrow and block crankshaft.

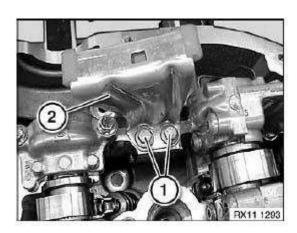


<u>Fig. 216: Identifying Special Tool (11 9 590) On Crankshaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove slide rail (2).

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<u>Fig. 217: Identifying Slide Rail With Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

To open central bolt, mount special tool 11 9 540 on camshaft. If the setting gauges cannot be positioned, grip the camshaft with an open-end wrench to release the central bolt.

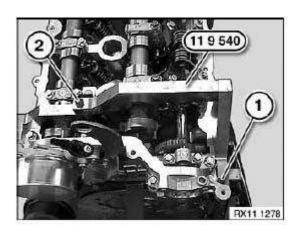
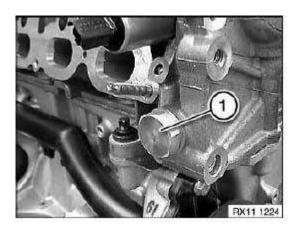


Fig. 218: Identifying Special Tool (11 9 540) On Inlet Camshaft Courtesy of BMW OF NORTH AMERICA, INC.

Release chain tensioner (1) (have a cleaning cloth ready).

Tightening torque: See ENGINE - TIGHTENING TORQUES.

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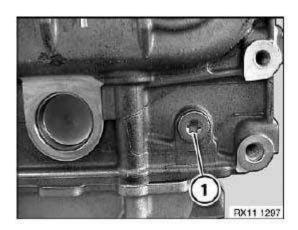
<u>Fig. 219: Identifying Chain Tensioner</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pin (1) on guide rail.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Installation:

Replace sealing ring.



<u>Fig. 220: Identifying Bearing Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolts of inlet adjustment unit (1) and exhaust adjustment unit (2).

Detach inlet adjustment unit from inlet camshaft.

Detach exhaust adjustment unit from exhaust camshaft.

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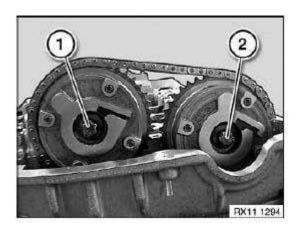


Fig. 221: Identifying Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- Danger of mixing up adjustment units .
- Mixing up the adjustment units will result in engine damage.

The inlet and exhaust adjustment units are different.

VANOS is marked with IN for the inlet camshaft.

VANOS is marked with EX for the exhaust camshaft.

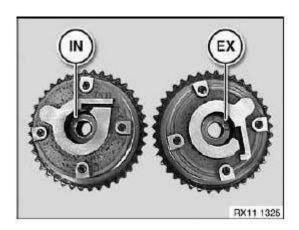


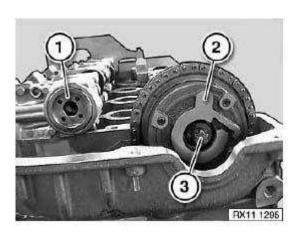
Fig. 222: Identifying Inlet Camshaft And Exhaust Camshaft Courtesy of BMW OF NORTH AMERICA, INC.

Place adjustment units of exhaust camshaft marked EX on timing chain.

Position adjustment unit on exhaust camshaft and secure with central bolt (3).

The installation position of the adjustment units can be freely selected.

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<u>Fig. 223: Identifying Central Bolt</u> Courtesy of BMW OF NORTH AMERICA, INC.

Place adjustment units of inlet camshaft marked IN on timing chain.

Position adjustment unit on inlet camshaft and secure with central bolt (1).

The installation position of the adjustment units can be freely selected.

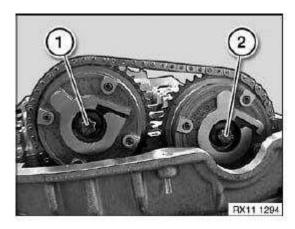
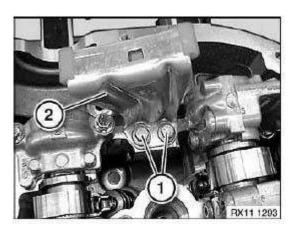


Fig. 224: Identifying Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Install slide rail (2).

Insert screws (1).

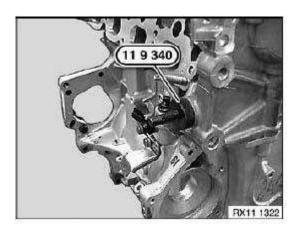
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<u>Fig. 225: Identifying Slide Rail With Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 340 into cylinder head.

Pretension timing chain with special tool to $0.4\ Nm$.

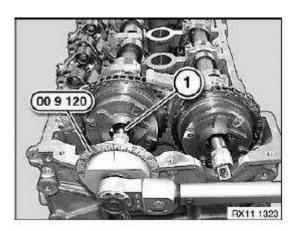


<u>Fig. 226: Identifying Special Tool (11 9 340) Into Cylinder Head</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) with special tool 00 9 120.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

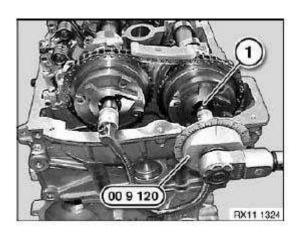
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<u>Fig. 227: Identifying Special Tool (00 9 120) On Central Bolt</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) with special tool 00 9 120.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 228: Identifying Special Tool (00 9 120) On Central Bolt</u> Courtesy of BMW OF NORTH AMERICA, INC.

Fit chain tensioner.

Check timing.

Assemble engine.

11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N12)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunction if valves are contaminated:

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- Rough running.
- OBD fault entry.
- Exhaust emission behavior.
- Low engine power.

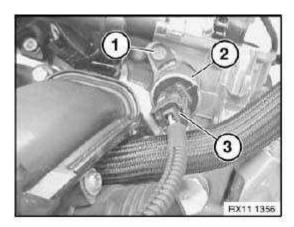
Necessary preliminary tasks:

• Remove acoustic cover

Disconnect plug connection for solenoid valve (3) - inlet.

Release screw (1).

Remove solenoid valve (2) for inlet side.



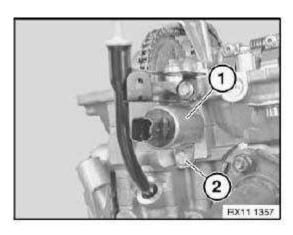
<u>Fig. 229: Identifying Plug Connection For Solenoid Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for solenoid valve - exhaust.

Release screw (2).

Remove solenoid valve (1) for exhaust side.

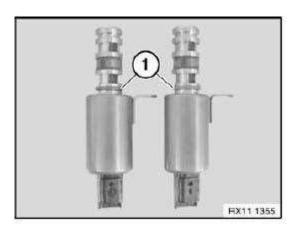
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<u>Fig. 230: Identifying Solenoid Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on solenoid valves.



<u>Fig. 231: Identifying Sealing Rings On Solenoid Valves</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

37 VARIABLE VALVE GEAR

11 37 005 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT (N12)

Special tools required:

• 11 4 481

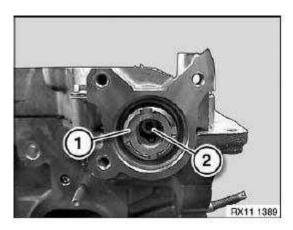
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Necessary preliminary tasks:

- Remove cylinder head cover.
- Remove intermediate lever.
- Remove inlet camshaft.

Release screw (2) on magnet wheel (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 232: Identifying Magnet Wheel And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pay attention to journal and groove on intermediate shaft and magnet wheel.

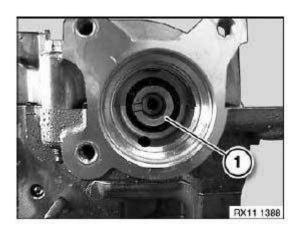


Fig. 233: Identifying Magnet Wheel Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is extremely magnetic.

After removing, protect magnet wheel (1) against metal chips by placing it in a

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plastic bag (2) with a seal.

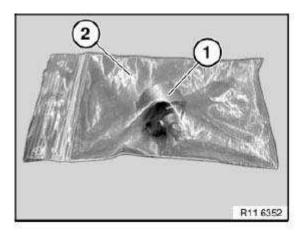


Fig. 234: Identifying Plastic Bag With Seal Courtesy of BMW OF NORTH AMERICA, INC.

Adjust eccentric shaft to minimum lift (1).

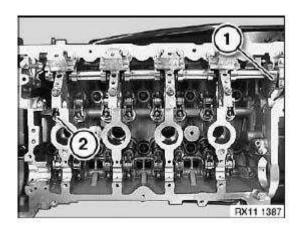


Fig. 235: Identifying Eccentric Shaft Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on all bearing caps (1).

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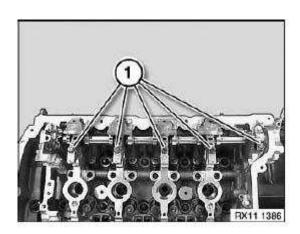
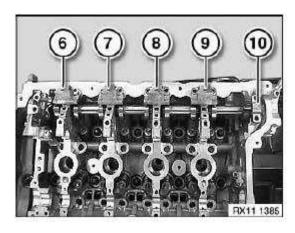


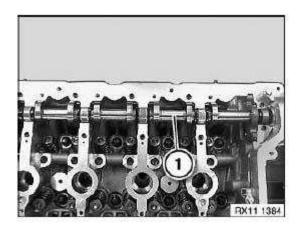
Fig. 236: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

All bearing caps are marked with numbers from (6 to 10); set down in neat order in special tool 11 4 481.



<u>Fig. 237: Identifying Mark With Number On Bearing Caps</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove intermediate shaft (1).



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Fig. 238: Identifying Intermediate Shaft

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If one or more needle bearings are faulty, the complete eccentric shaft must be replaced.

Magnet wheel (2) is highly magnetic. No metal chips must stick to the magnet wheel (2), replace if necessary.

Check all needle bearings (3) of eccentric shaft (1) for ease of movement.

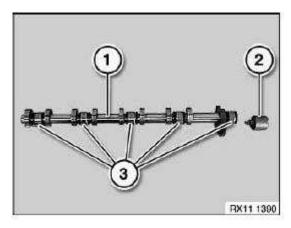


Fig. 239: Identifying Eccentric Shaft, Magnet Wheel And Needle Bearings Courtesy of BMW OF NORTH AMERICA, INC.

Bearing cap number 10 is provided with a stop.

Lubricate all bearing caps with engine oil.

All bearing caps (1) are identified with numbers from (6 to 10).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Adjust eccentric shaft minimum lift.

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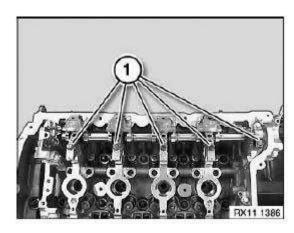


Fig. 240: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Check eccentric shaft for ease of movement.

Assemble engine.

11 37 010 REMOVING AND INSTALLING/REPLACING INTERMEDIATE LEVER (N12)

Special tools required:

- 11 4 480
- 11 5 571
- 11 9 571
- 11 9 572
- 11 9 573

WARNING: Danger of injury!

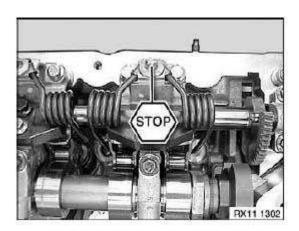
A special tool is essential for opening the return spring on the intermediate lever.

Necessary preliminary tasks:

• Remove cylinder head cover.

IMPORTANT: Release screw with special tool only.

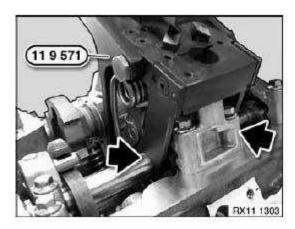
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<u>Fig. 241: Identifying Intermediate Lever Stop</u> Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 571 on bearing block of balancing shaft so that it rests on intermediate shaft (see arrow).

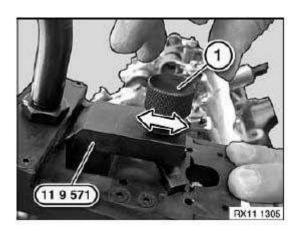
If necessary, set eccentric shaft (1) to minimum lift (2).



<u>Fig. 242: Identifying Special Tool (11 9 571) On Bearing Block</u> Courtesy of BMW OF NORTH AMERICA, INC.

Clamp return spring with knurled screw (1).

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<u>Fig. 243: Identifying Special Tool (11 9 571)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Make sure return spring is correctly seated on special tool 11 9 571 (see arrow).

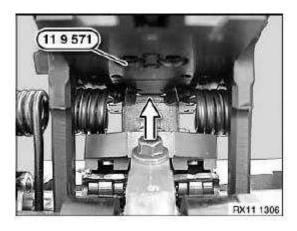
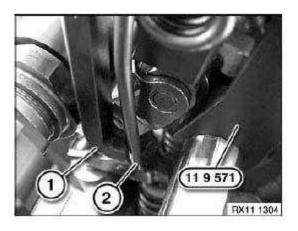


Fig. 244: Identifying Special Tool (11 9 571)
Courtesy of BMW OF NORTH AMERICA, INC.

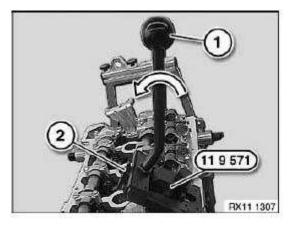
When special tool 11 9 571 is correctly positioned, return spring (2) can be pressed back with lever (1).



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<u>Fig. 245: Identifying Return Spring With Lever</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lever (1) in direction of arrow on special tool 11 9 571 until locking hook (2) engages on special tool 11 9 571.



<u>Fig. 246: Pressing Lever With Special Tool (11 9 571)</u> Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury! at return spring.

Locking hook (1) must engage on special tool 11 9 571 (see arrow).

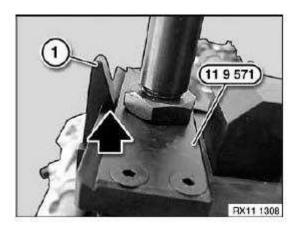
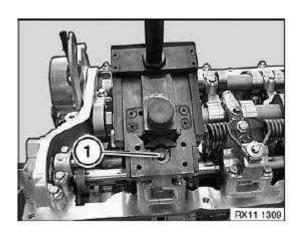


Fig. 247: Locking Hook Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

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<u>Fig. 248: Identifying Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 9 572 on a vice (1).

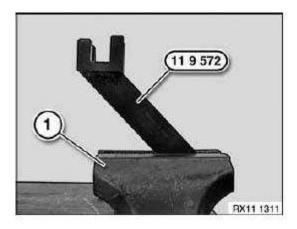
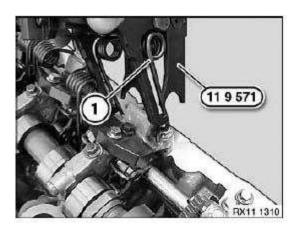


Fig. 249: Identifying Special Tool (11 9 572) In Vice Courtesy of BMW OF NORTH AMERICA, INC.

Feed out special tool 11 9 571 in return spring (1).



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Fig. 250: Identifying Special Tool (11 9 571) On Return Spring Courtesy of BMW OF NORTH AMERICA, INC.

Set down special tool 11 9 571 on special tool 11 9 572 (see arrow).

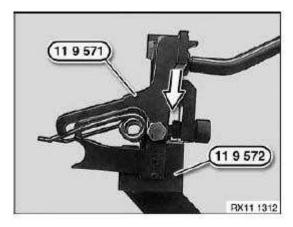
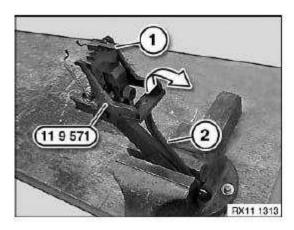


Fig. 251: Identifying Special Tool (11 9 571 And 11 9 572) Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury! at return spring.

Release locking hook (1) on special tool $11\ 9\ 571$.

Release lever (2) in direction of arrow.



<u>Fig. 252: Removing Lever</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screw (1) in direction of arrow.

Remove return spring (2).

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Set all return springs down on special tool 11 4 480 in a tidy and orderly fashion.

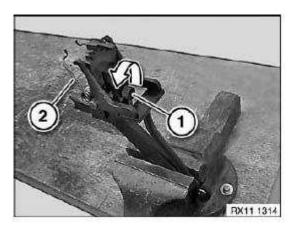
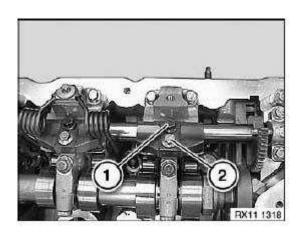


Fig. 253: Removing Return Spring Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (2).

Release centering bolt (1).

Remove locating plate and set down on special tool 11 4 480 in a tidy and orderly fashion.



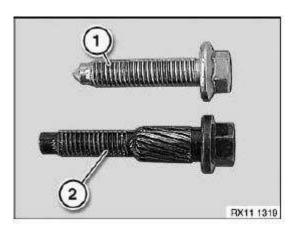
<u>Fig. 254: Identifying Centering Bolt</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Screw (1) Setscrew (2)

Installation:

Observe screwing sequence

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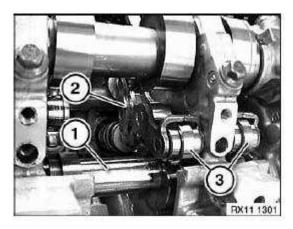


<u>Fig. 255: Identifying Screw And Setscrew</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove roller cam follower (3) towards top and set down on special tool 11 4 480 in a tidy and orderly fashion.

Installation:

Uniform distribution must not be changed.



<u>Fig. 256: Identifying Roller Cam Follower</u> Courtesy of BMW OF NORTH AMERICA, INC.

All roller cam followers are classified.

Values of 0 to 5 are installed.

NOTE: A uniform distribution can only be calculated with the diagnosis tester.

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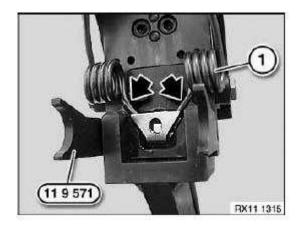


Fig. 257: Identifying Roller Cam
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of roller cam followers.

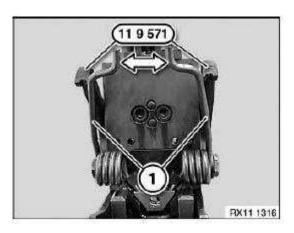
Position torsion spring (1) on special tool 11 9 571 (see arrows) and clamp with knurled screw.



<u>Fig. 258: Identifying Special Tool (11 9 571) On Torsion Spring</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press torsion spring (1) in direction of arrow and position with lever of special tool 11 9 571.

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<u>Fig. 259: Pressing Torsion Spring</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pretension spiral-wound spring (1) with special tool 11 9 571 in direction of arrow.

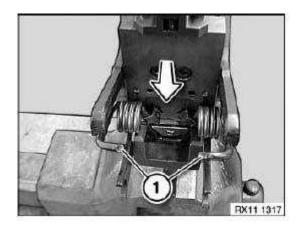


Fig. 260: Identifying Spiral-Wound Spring Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury! at torsion spring.

Locking hook (1) must engage on special tool 11 9 571 (see arrow).

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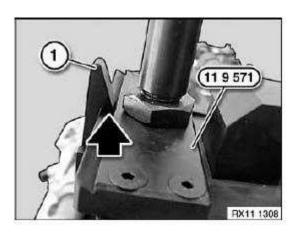
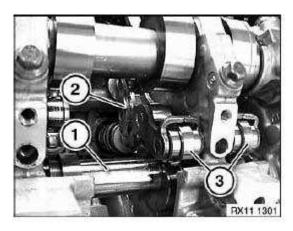


Fig. 261: Locking Hook Courtesy of BMW OF NORTH AMERICA, INC.

Insert intermediate levers (3).

Installation:

Make sure roller cam followers (2) are in correct installation position.



<u>Fig. 262: Identifying Roller Cam Follower</u> Courtesy of BMW OF NORTH AMERICA, INC.

Install guide block.

Insert setscrew (1).

Insert screw (2).

Join screws (1 and 2) to 5 Nm.

Release screws (1 and 2) back by 90°.

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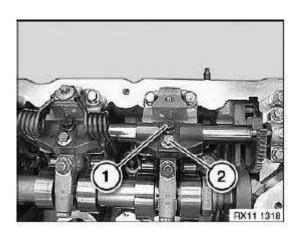


Fig. 263: Identifying Centering Bolt Courtesy of BMW OF NORTH AMERICA, INC.

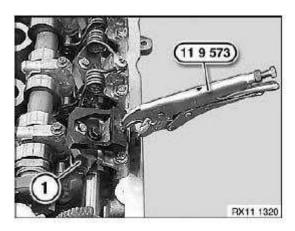
Pretension guide block (1) with special tool 11 9 573.

Secure setscrews of guide block (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Secure screw on guide block (1).

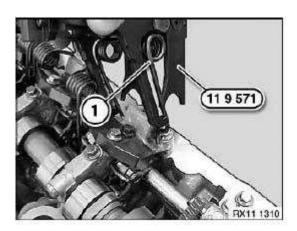
Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 264: Identifying Special Tool (11 9 573) On Guide Block</u> Courtesy of BMW OF NORTH AMERICA, INC.

Feed in return spring (1) with special tool 11 5 571 and position.

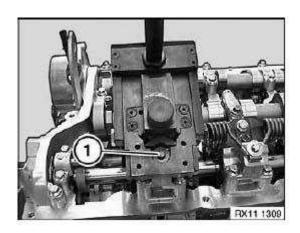
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<u>Fig. 265: Identifying Special Tool (11 9 571) On Return Spring</u> Courtesy of BMW OF NORTH AMERICA, INC.

Secure screw (1) of return spring.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



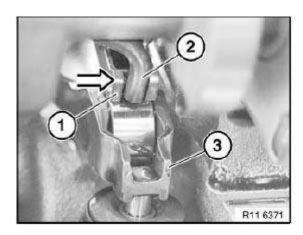
<u>Fig. 266: Identifying Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert return spring (2) in intermediate lever (1) (see arrow).

Check roller cam follow (3) again to ensure correct installation position.

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<u>Fig. 267: Identifying Return Spring, Intermediate Lever And Roller Cam Follow</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 37 020 REMOVING AND INSTALLING/REPLACING POSITIONING MOTOR FOR ECCENTRIC SHAFT (N12)

Necessary preliminary tasks:

• Remove acoustic cover.

Disconnect plug connection (2) on servodrive.

Pull off engine wiring harness at retaining clip (1) from servodrive.

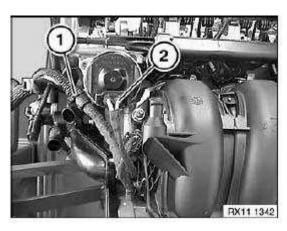


Fig. 268: Identifying Plug Connection And Retaining Clip Courtesy of BMW OF NORTH AMERICA, INC.

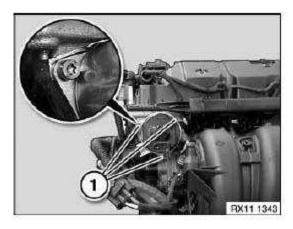
Release screws (1).

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Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Installation:

Replace seal.



<u>Fig. 269: Identifying Servodrive Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to intermediate shaft.

Turn screwdriver (1) counterclockwise in direction of arrow and relieve tension on intermediate shaft.

NOTE: Do not rotate shaft too far up to maximum to end stop.

Remove servodrive.

Installation:

Insert servodrive with screwdriver (2).

Assemble engine.

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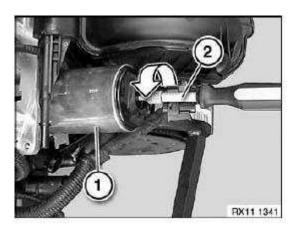


Fig. 270: Inserting Servodrive With Screwdriver Courtesy of BMW OF NORTH AMERICA, INC.

Check function of DME.

11 37 030 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT SENSOR (N12)

Necessary preliminary tasks:

• Check function of DME.

Disconnect plug connection (1).

Release screws (2).

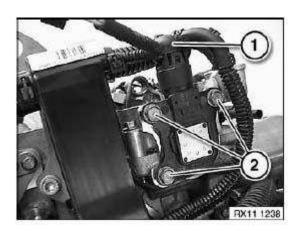


Fig. 271: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

40 OIL SUPPLY

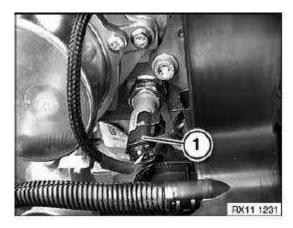
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11 40 000 CHECKING ENGINE OIL PRESSURE (N12)

Special tools required:

- 11 7 020
- 11 9 560
- 13 3 061
- 13 3 063
- 13 6 051
- 13 6 054

Disconnect plug connection (1) on oil pressure switch.



<u>Fig. 272: Identifying Plug Connection On Oil Pressure Switch</u> Courtesy of BMW OF NORTH AMERICA, INC.

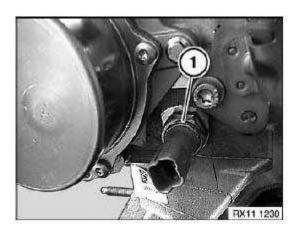
Release oil pressure switch (1) with special tool 11 7 020.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Installation:

Replace sealing ring.

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<u>Fig. 273: Identifying Oil Pressure Switch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 9 560 with sealing ring on cylinder head.

Secure pressure gauge connection 13 3 063 to special tool 11 9 560.



Fig. 274: Identifying Special Tool (13 0 063 And 11 9 560) Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with diagnosis tester.

Connect special tools 11 9 560 / 13 6 054 and 13 6 051.

Check engine oil pressure with pressure gauge.

Connect special tools 11 9 560 / 13 3 063 and 13 3 061.

Start engine and check engine oil pressure.

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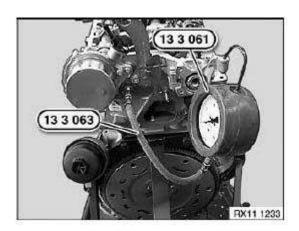


Fig. 275: Identifying Special Tool (13 0 063 And 13 3 061) Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

41 OIL PUMP WITH FILTER A

11 41 000 REMOVING AND INSTALLING OIL PUMP (N12)

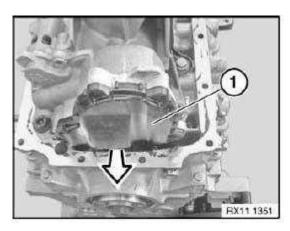
Necessary preliminary tasks:

• Removing oil pan.

Pull off cover (1) in direction of arrow.

Installation:

Replace cover (1).



<u>Fig. 276: Removing Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Release screw (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Grip central bolt (2) to release central bolt (1).

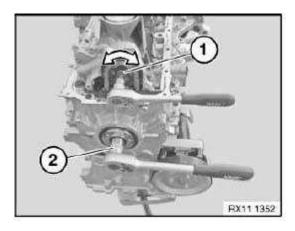
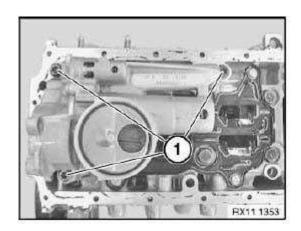


Fig. 277: Tightening Central Bolt Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 278: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

42 OIL FILTER AND LINES

11 42 020 REMOVING AND INSTALLING/REPLACING MAIN FLOW OIL FILTER (N12)

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WARNING: Danger of scalding! Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Unfasten oil filter cover.
- Remove exhaust manifold.

Release screws (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

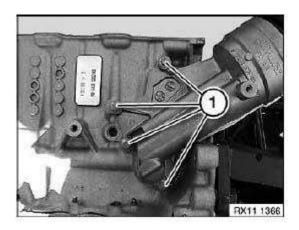


Fig. 279: Identifying Cylinder Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Replace seal (1).

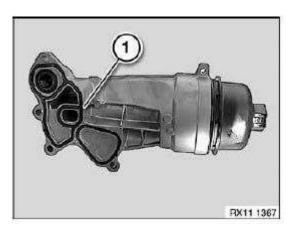


Fig. 280: Identifying Seal Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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43 OIL FILLING, DIPSTICK

11 43 000 REMOVING AND INSTALLING/REPLACING GUIDE TUBE FOR DIPSTICK (N12)

Necessary preliminary tasks:

• Pull dipstick out of guide tube.

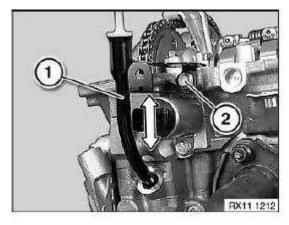
Release screw (2).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Pull dipstick (1) up in direction of arrow.

Installation:

Replace O-ring.



<u>Fig. 281: Pulling Dipstick</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check engine oil level, top up if necessary

51 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N12)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

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Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

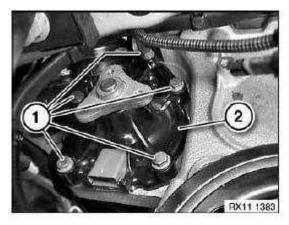
• Remove friction gear.

Release screws (1).

Installation:

Replace seal.

Clean sealing surfaces.



<u>Fig. 282: Identifying Water Pump Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Venting instructions must be observed without fail.

53 THERMOSTAT AND CONNECT

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N12)

Special tools required:

• 17 2 050

WARNING: Danger of scalding!
Only perform these tasks on an engine that has cooled down.

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Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

• Drain coolant from radiator.

Release lock (1) on coolant pipe in direction of arrow.

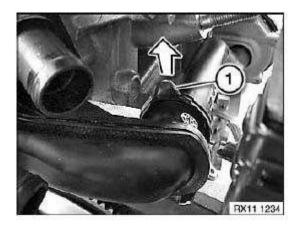


Fig. 283: Identifying Lock On Coolant Pipe Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on coolant thermostat.

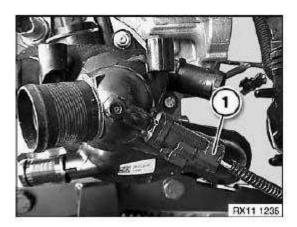


Fig. 284: Identifying Plug Connection On Coolant Thermostat Courtesy of BMW OF NORTH AMERICA, INC.

Detach all coolant hoses from thermostat.

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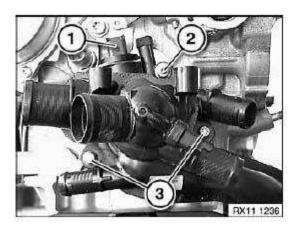
NOTE: • Release metal hose clamps with special tool 17 2 050 .

Disconnect plug connection (1) on coolant temperature sensor.

Slacken nut (2).

Release screws (3).

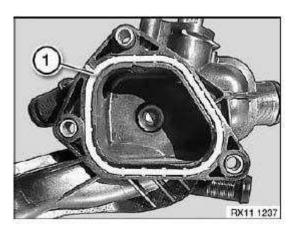
Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 285: Identifying Plug Connection On Coolant Temperature Sensor</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace seal (1).



<u>Fig. 286: Identifying Seal Area</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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Vent cooling system and check for leaks.

61 INTAKE MANIFOLD

11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N12)

Necessary preliminary tasks:

- Remove suction filter housing.
- Remove engine cover.

Unfasten engine wiring harness (1) on intake manifold.

Disconnect plug connection (2).

Disconnect plug connection (3) on tank vent valve.

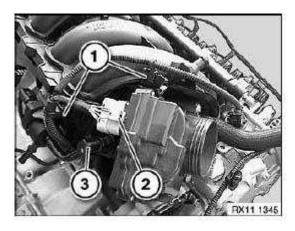
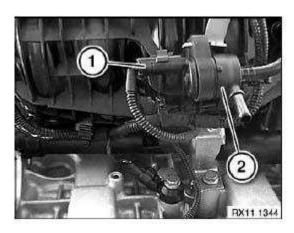


Fig. 287: Identifying Engine Wiring Harness On Intake Manifold Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release tank vent valve (2).

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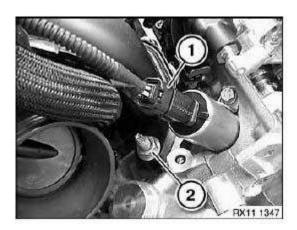
<u>Fig. 288: Identifying Tank Vent Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on solenoid valve.

Release engine breathers and hold to one side.

Slacken nut (2).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

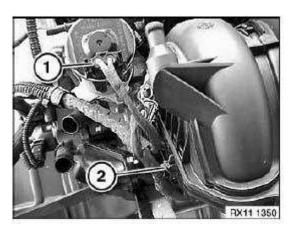


<u>Fig. 289: Identifying Plug Connection On Solenoid Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unfasten engine wiring harness (2) on intake manifold.

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<u>Fig. 290: Identifying Engine Wiring Harness On Intake Manifold</u> Courtesy of BMW OF NORTH AMERICA, INC.

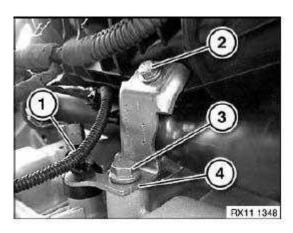
Release cable (1) at intake manifold holder.

Release screw (2).

Release screw (3).

Take off holder (4).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 291: Identifying Cable And Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Unscrew nuts (3).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

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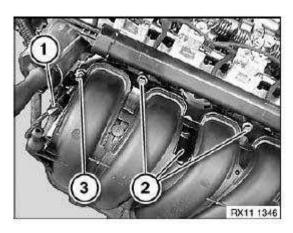


Fig. 292: Identifying Screw And Nut Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all seals.

Assemble engine.

62 EXHAUST MANIFOLD

11 62 000 REMOVING AND INSTALLING, SEALING/REPLACING EXHAUST MANIFOLD (N12)

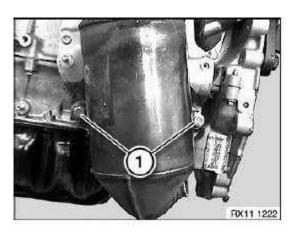
Necessary preliminary tasks:

- Move front end into assembly position.
- Remove exhaust system.
- Remove both lambda oxygen sensors.
- Detach heat shield.

Release screws (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

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<u>Fig. 293: Identifying Exhaust Manifold Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release all nuts (1).

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

Feed out exhaust manifold (1) downwards.

Installation:

Replace all seals.

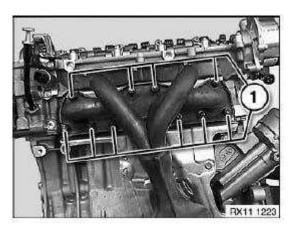


Fig. 294: Identifying Exhaust Manifold Nut Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

66 VACUUM PUMP

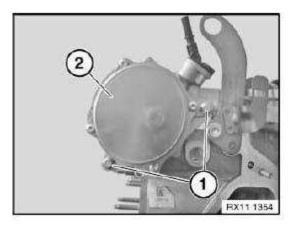
11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N12)

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Release vacuum connection to brake booster.

Release screws (1).

Pull out vacuum pump (2).



<u>Fig. 295: Identifying Vacuum Pump</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring (1).

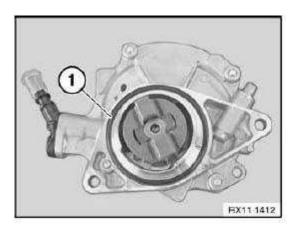


Fig. 296: Identifying Sealing Ring Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

78 EMISSION CONTROL, OXYGEN

11 78 510 REMOVING AND INSTALLING/REPLACING CONTROL SENSOR (N12)

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Special tools required:

11 7 020

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Installation:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Service) to thread.

The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for control sensor.

Release oxygen sensor (1) with special tool 11 7 020.

Tightening torque: See ENGINE - TIGHTENING TORQUES.

NOTE: For purposes of clarity, illustration shows and description refers to the removed engine.

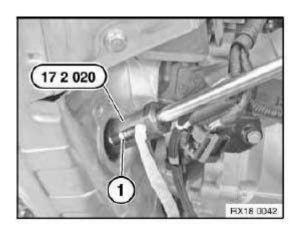


Fig. 297: Identifying Special Tool (11 7 020) On Oxygen Sensor Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 78 510 REMOVING AND INSTALLING/REPLACING LAMBDA CONTROL SENSORS (N12)

Special tools required:

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11 7 020

WARNING: Scalding hazard!
Only perform these tasks after the exhaust system has cooled down.

Necessary preliminary tasks:

• Read fault memory.

Installation:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Service) to thread.

The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for lambda control sensor.

Release oxygen sensor (1) with special tool 11 7 020.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.



Fig. 298: Identifying Special Tool (11 7 020) On Oxygen Sensor Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 78 610 REMOVING AND INSTALLING/REPLACING LAMBDA MONITOR SENSORS (N12)

Special tools required:

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- 11 7 030
- 11 9 150

WARNING: Scalding hazard! Only perform these tasks after the exhaust system has cooled down.

Necessary preliminary tasks:

• Read fault memory.

Installation:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Service) to thread.

The part of the oxygen monitor sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for oxygen monitor sensor.

Release monitor sensor (1) with special tools 11 7 030 and 11 9 150.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

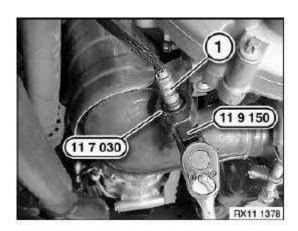


Fig. 299: Identifying Special Tools (11 7 030 And 11 9 150) On Monitor Sensor Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 78 610 REMOVING AND INSTALLING/REPLACING MONITOR SENSOR (N12)

Special tools required:

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• 11 7 020

WARNING: Scalding hazard!

Only perform these tasks after the exhaust system has cooled down.

Installation:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Service) to thread.

The part of the oxygen monitor sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for monitor sensor.

Release monitor sensor (1) with special tool 11 7 020.

Tightening torque: See **ENGINE - TIGHTENING TORQUES**.

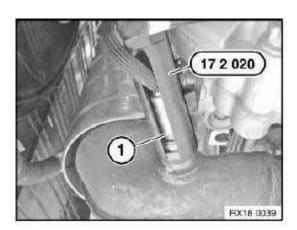


Fig. 300: Identifying Special Tool (11 7 020) On Monitor Sensor Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

2007 ENGINE Engine Electrical System - Repair Instructions - Cooper

2007 ENGINE

Engine Electrical System - Repair Instructions - Cooper

00 TROUBLESHOOTING

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

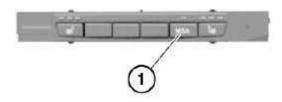
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 1: Identifying MSA Means Of Button Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

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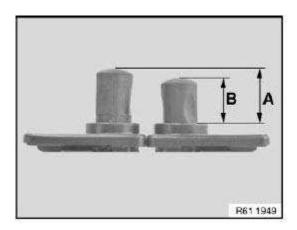


Fig. 2: Identifying Engine Hood/Bonnet Contact Setting Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

NOTE: For further information on automatic engine start-stop system (MSA):

• Refer to <u>GENERAL ELECTRICAL SYSTEM - REPAIR INSTRUCTIONS - 2007</u> HATCHBACK or appropriate Service Information.

12 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe safety instructions for handling vehicle battery.

Before disconnecting battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

IMPORTANT:

- There is a danger of mixing up battery leads: If the battery positive and negative leads are the same colour and you are in doubt, follow the polarity to the battery, then mark and cover the leads.
- On vehicles with radio code: After disconnecting the battery, the radio code must be re-entered. Therefore obtain the radio code card from the customer beforehand. Note stored stations and restore them after connecting the battery.
- Stored settings of the on-board computer and clock will also be lost.
- All available central keys must be recoded for cars with first generation infrared transmitter locking systems.

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General notes on disconnecting battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

Do not under any circumstances pull/lever off pole shoes by force.

Do not under any circumstances release socket-head cap screw of IBS.

- Detach terminal of battery negative lead from car battery and second battery if fitted. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK**.

After connecting battery:

IMPORTANT: After a power supply interruption some equipment is disabled and must be reactivated.

Likewise, individual settings are lost and must be activated. Example:

Vehicles with build date from 03/2007:

Teach-in mid-position for power steering

- If necessary, activate sliding sunroof
- If necessary, carry out adjustment of active front steering
- If necessary, activate power windows
- If necessary, activate mirror with compass

Please refer to the Progman user documentation for further information on vehicle-specific activation.

Vehicles with a two-battery system

Starter and equipment batteries

A two-battery system has a starter battery circuit and an equipment battery circuit. A secondary control unit monitors both battery circuits. Depending on the situation, the battery circuits are connected to or isolated from the secondary control unit via an isolating relay.

Two AGM batteries are used as a storage battery.

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IMPORTANT: These batteries must not under any circumstances be charged with a voltage in excess of 14.8 V. Rapid programs must not be used either.

Receiving/giving starting assistance via jump start terminal - the engine can be jump-started with an external voltage supply via the jump start terminal on the right side of the engine compartment.

NOTE: The starter battery is isolated from the alternators when the engine hood/bonnet is open.

Giving starting assistance via the jump start terminal is thus limited by the capacity of the starter battery when the engine hood/bonnet is open.

Charging starter and equipment batteries via jump start terminal - the starter battery is charged as a matter of priority with a charger connected to the jump start terminal. The voltage at the starter battery is the decisive factor in determining whether the equipment battery is also included in the charging operation. The secondary control unit automatically detects a charging operation at a charging voltage at the starter battery of > or = 13.5 V. The isolating relay is closed and thus the equipment battery is connected in parallel. Both batteries are now charged.

Prerequisite:

- Terminal 61 inactive
- Terminal 15 inactive

If terminal 15 becomes "active" during the charging operation, the isolating relay is opened immediately and again only the starter battery is charged.

NOTE:

When the engine hood is open, the isolating relay is also opened in normal operation when the engine is running.

A special mode can be set by means of diagnosis for workshop/garage operation. The isolating relay is closed from terminal R in this operating mode. This mode is automatically reset once a distance of 5 km has been driven.

Trickle charging

The increased closed-circuit current consumption can be compensated for via the jump-start connection point with the aid of the "Acctiva easy" battery trickle charger (Service Information 2 03 05 205).

IMPORTANT: The cigarette lighter is isolated from the electrical system after terminal R "OFF" on a timed basis (60 mins.), thereby interrupting charging of the equipment battery via the cigarette lighter. This is prevented if the battery master switch (on the right side of the luggage compartment behind the panel) is turned on and off again twice within 2 seconds. (Cigarette light battery charging function).

2007 ENGINE Engine Electrical System - Repair Instructions - Cooper

IMPORTANT:

- Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any faults have been remedied, cancel the fault memory.
- Control unit plugs should only ever be connected and disconnected while the ignition is turned off.
- The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.
- Investigate stored faults and, once any faults have been remedied, cancel the fault memory.

Comply with the following when replacing the DME/DDE (Digital Motor Electronics/Digital Diesel Electronics):

- o Always read out hardware/software version of the corresponding control unit with DIS tester.
 - Comply with the instructions of the DIS tester on the steps coding and programming.
 - On vehicles with electronic vehicle immobilization, comply with the instructions of the DIS tester.
- Each control unit is programmed with certain basic values, which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.
- If, for example, the DME control unit would be without current for a long time (more than an hour), its
 adaptive system would lose the stored values. When a cleared control unit is restarted or a new control
 unit is installed, the adaptive system must read in and store the input values of the associated engine as
 new basic values itself.
- This procedure could lead to erratic idling and disturbed overrunning of the engine after starting.
 Depending on the engine it could require some time before all values are adapted to the engine condition.
- o Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit:
 - 1. If possible before exchanging control unit, run engine up to operating temperature.
 - 2. Remove the control unit, install a new control unit and operate vehicle at different engine speeds.

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting -> Fault in fuel injection system.

- -> Spark plug faults
- -> Ignition coil faults
- -> Further fault patterns with evaluation

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-> Additional fault notes for troubleshooting

Oscillograms -> Normal oscillogram

-> Oscillograms of ignition coils from different manufacturers

Check -> Secondary signal for stationary ignition distribution

12 IGNITION WIRES, SPARK

12 12 011 REPLACING ALL SPARK PLUGS (N12)

Special tools required:

- 12 1 172
- 12 1 220

Necessary preliminary tasks:

Switch off ignition.

Remove ignition coils.

Unscrew and remove spark plugs with Special Tool 12 1 220.

Installation:

Tighten spark plugs, using special tool 12 1 220 in conjunction with special tool 12 1 172.

If special tool 12 1 172 is not used, observe tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK**.

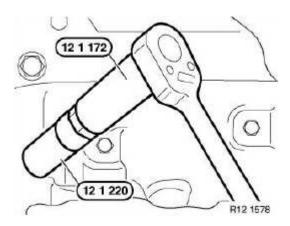


Fig. 3: Identifying Special Tool (12 1 172 And 12 1 220) Courtesy of BMW OF NORTH AMERICA, INC.

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13 IGNITION COIL

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting -> Fault in fuel injection system

- -> Spark plug faults
- -> Ignition coil faults
- -> Further fault patterns with evaluation
- -> Additional fault notes for troubleshooting

Oscillograms -> Normal oscillogram

-> Oscillograms of ignition coils from different manufacturers

Check -> Secondary signal for stationary ignition distribution

12 13 511 REPLACING IGNITION COILS (N12)

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Check stored fault messages
- Switch off ignition

Release bolts and remove cover (1).

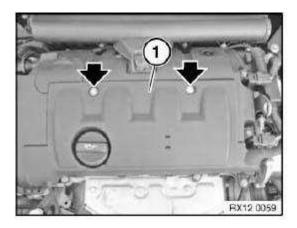


Fig. 4: Locating Cover Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug retainer (1) of ignition coil (2) and disconnect plug.

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Pull ignition coil (2) up and out.

This procedure is applicable to all ignition coils.

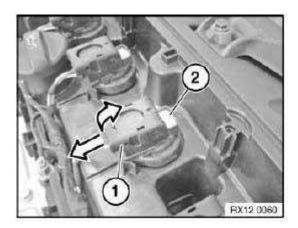
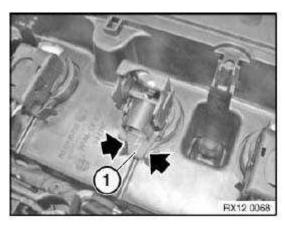


Fig. 5: Pulling Ignition Coil Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check that rubber seal of ignition coil (1) is correctly seated.



<u>Fig. 6: Locating Rubber Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Push plug (1) with plug retainer (2) open onto ignition coil.

Carefully close plug retainer (2) in direction of arrow.

The plug retainer must snap into place without great effort.

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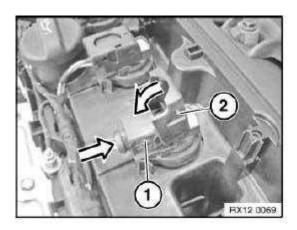


Fig. 7: Pushing Plug With Plug Retainer Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

14 ELECTRONIC SWITCHING

12 14 521 REPLACING PULSE GENERATOR ON CRANKSHAFT (N12, N14)

Necessary preliminary tasks:

- Switch off ignition
- Read out fault memory of DME control unit

NOTE: For purposes of clarity, the following work step is shown on the engine after it has been removed.

Remove cover (1).

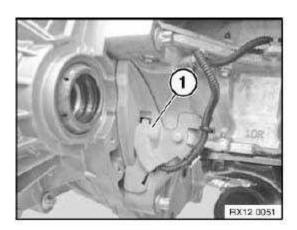


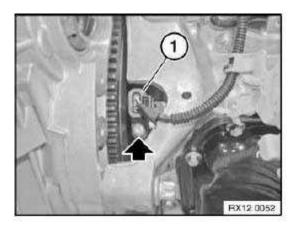
Fig. 8: Identifying Crankshaft Cover Courtesy of BMW OF NORTH AMERICA, INC.

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Unlock plug (1) and remove.

Release screw and remove pulse generator.

Tightening torque. Refer to <u>FUEL SUPPLY SYSTEM - TIGHTENING TORQUES -- 2007</u> <u>HATCHBACK</u>.



<u>Fig. 9: Identifying Crankshaft Plug</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages. Now clear the fault memory.

12 14 523 REPLACING PULSE GENERATOR ON INLET CAMSHAFT (N12)

Necessary preliminary tasks:

- Switch off ignition
- Read out fault memory of DME control unit
- Check stored fault messages

Unlock plug (1) and remove.

Release screw and remove pulse generator (2).

Installation:

Replace sealing ring and coat with antiseize agent.

Tightening torque. Refer to <u>FUEL SUPPLY SYSTEM - TIGHTENING TORQUES -- 2007</u> <u>HATCHBACK</u>.

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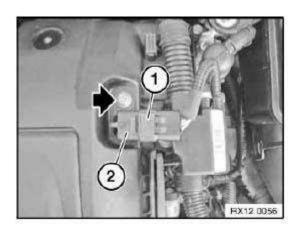


Fig. 10: Identifying Pulse Generator With Plug Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

12 14 524 REPLACING PULSE GENERATOR ON EXHAUST CAMSHAFT (N12)

Necessary preliminary tasks:

- Switch off ignition
- Read out fault memory of DME control unit
- Check stored fault messages

Unlock plug (1) and remove.

Release screw and remove pulse generator (2).

Installation:

Replace sealing ring and coat with anti-seize agent.

Tightening torque. Refer to <u>FUEL SUPPLY SYSTEM - TIGHTENING TORQUES -- 2007</u> <u>HATCHBACK</u>.

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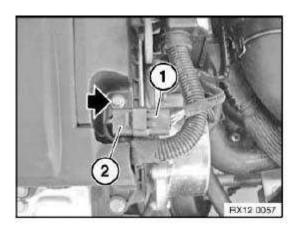


Fig. 11: Identifying Pulse Generator With Plug Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

12 14 550 REPLACING CONTROL UNIT (DME)

Necessary preliminary tasks:

• Switch off ignition

• Disconnect battery

IMPORTANT: Follow instructions for removing and installing electronic control units.

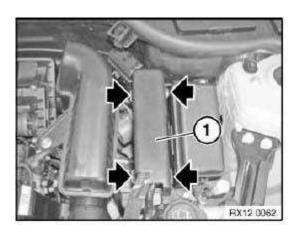
IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

NOTE:

- Connect diagnosis system
- Read fault memory.
- Check stored fault messages
- Rectify faults
- Clear fault memory

Unlock and remove cover (1).

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<u>Fig. 12: Identifying Control Unit Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

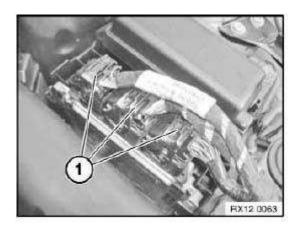


Fig. 13: Identifying Unlock Plug Courtesy of BMW OF NORTH AMERICA, INC.

Press locks in direction of arrow and remove control unit (2) towards top.

Locks are accessible through bores (1).

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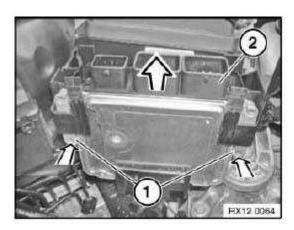


Fig. 14: Removing Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- Check stored fault messages
- Clear fault memory

12 14 600 REPLACING KNOCK SENSOR (N12, N14)

Necessary preliminary tasks:

- Switch off ignition
- Read out fault memory of DME control unit
- Check stored fault messages

Installation location:

The knock sensor is located under the intake manifold next to the starter motor.

Unlock plug (1) and remove.

Release screw and remove knock sensor (2).

Installation:

Clean contact surface of knock sensor on engine block.

Tightening torque. Refer to <u>FUEL SUPPLY SYSTEM - TIGHTENING TORQUES -- 2007</u> **HATCHBACK** .

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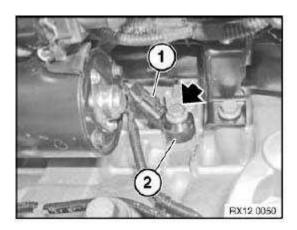


Fig. 15: Identifying Knock Sensor And Unlock Plug Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

12 14 705 PROGRAMMING CONTROL UNIT (DME / DDE)

Switch off ignition.

Connect MoDiC or DIS/GT1 Tester.

Switch on ignition.

Select "Programming".

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- o DME (Digital Motor Electronics) or
- o DDE (Digital Diesel Electronics)

Refer to service information bulletins on subject of programming.

31 ALTERNATOR WITH DRIVE

12 31 009 CHECKING ALTERNATOR (BSD)

Necessary preliminary tasks:

- Correct connections on charged battery
- Correct connections on alternator and starter motor

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- Good ground connection between engine and body
- Tensioned ribbed V-belt
- Read out DME/DDE fault memory.

NOTE: The alternator with BSD interface can communicate with the engine control unit

(DME/DDE). The alternator is not connected to the charge telltale light.

The alternator can identify various faults.

BSD alternator can be recognized by the plug connection on the alternator.

Connect diagnosis tester.

- o Function selection
- o Complete vehicle
- o Drive
- o Voltage and current regulation
- o Voltage and current generation
- Alternator
- o Follow instruction in diagnostic program

Oscillogram for a fault-free alternator:

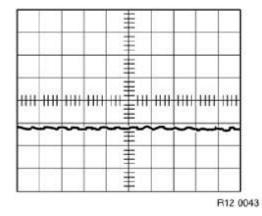


Fig. 16: Identifying Fault-Free Alternator Graph Courtesy of BMW OF NORTH AMERICA, INC.

Oscillogram for a faulty alternator:

One phase interrupted.

Repair/exchange alternator.

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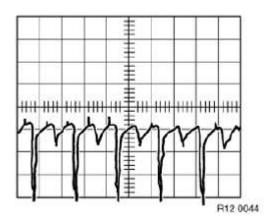


Fig. 17: Identifying One Phase Interrupted Graph Courtesy of BMW OF NORTH AMERICA, INC.

Interturn fault.

Repair/exchange alternator.

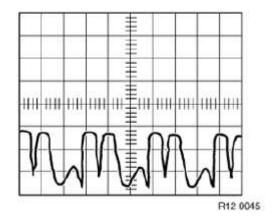


Fig. 18: Identifying Interturn Fault Graph Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in negative diode.

Repair/exchange alternator.

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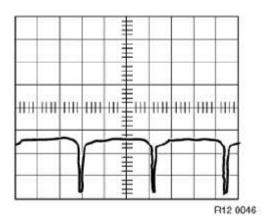
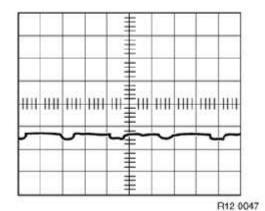


Fig. 19: Identifying Open Circuit In Negative Diode Graph Courtesy of BMW OF NORTH AMERICA, INC.

Short circuit in positive diode.

Repair/exchange alternator.

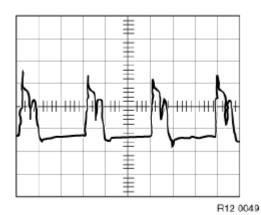


<u>Fig. 20: Identifying Short Circuit In Positive Diode Graph</u> Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in positive diode.

Repair/exchange alternator.

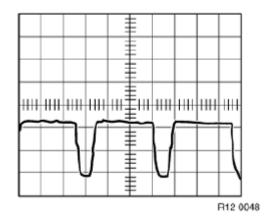
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<u>Fig. 21: Identifying Open Circuit In Positive Diode Graph</u> Courtesy of BMW OF NORTH AMERICA, INC.

Open circuit in exciter diode.

Repair/exchange alternator.



<u>Fig. 22: Identifying Open Circuit In Exciter Diode Graph</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME/DDE.

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N12, N14)

Necessary preliminary tasks:

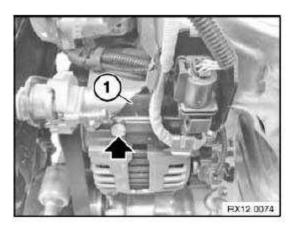
- Switch off ignition
- Disconnect battery negative lead
- Move front panel into assembly position

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N14 only:

Release bolt.

Remove bracket (1) and place to one side.



<u>Fig. 23: Locating Bracket Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Bring belt tensioner (1) with wrench (2) into assembly position and hold.

Secure assembly position of belt tensioner (1) by sliding locating pin (3) in direction of arrow.

WARNING: Danger of injury!

Remove wrench (2) again from belt tensioner (1).

Remove drive belt (4) from alternator.

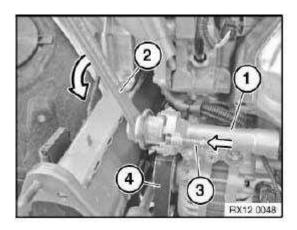


Fig. 24: Identifying Belt Tensioner Positions And Sliding Locating Pin Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector and remove.

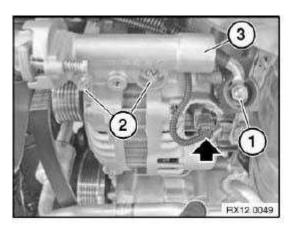
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Release nut (1) and remove battery positive lead.

Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK** .

Release screws (2) and remove belt tensioner (3).

Tightening torque. Refer to **ENGINE - TIGHTENING TORQUES**.



<u>Fig. 25: Locating Connector</u> Courtesy of BMW OF NORTH AMERICA, INC.

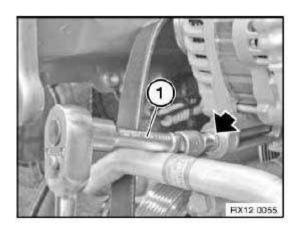
Release screw with joint extension (1).

Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK**.

IMPORTANT: Do not bend refrigerant line.

Bending the line can cause leaks!

Remove alternator.



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Fig. 26: Identifying Joint Extension Courtesy of BMW OF NORTH AMERICA, INC.

32 REGULATOR

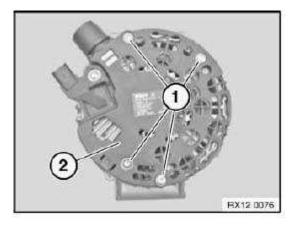
12 32 501 REPLACING REGULATOR SWITCH FOR ALTERNATOR (N12, N14)

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove alternator

Release screws (1).

Remove cover (2).

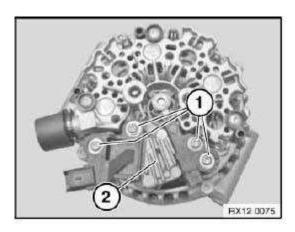


<u>Fig. 27: Identifying Alternator Cover Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

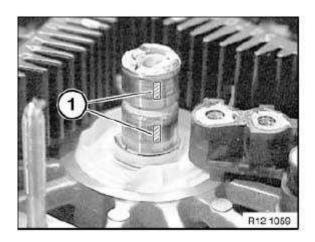
Remove controller switch (2).

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<u>Fig. 28: Identifying Controller Switch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Check contact surfaces (1) of slip rings for wear and recondition if necessary.



<u>Fig. 29: Identifying Contact Surfaces</u> Courtesy of BMW OF NORTH AMERICA, INC.

Assemble alternator.

Carry out alternator test with diagnostic system.

41 STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (N12, N14)

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery
- Remove intake filter housing

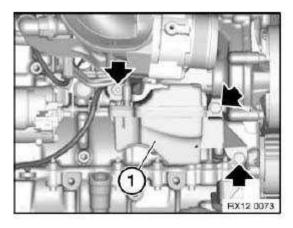
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- N12: Remove tank venting valve
- Remove right wheel

NOTE: For purposes of clarity, the following work steps are shown on the engine after it has been removed.

N14 only:

Release bolts and lay vacuum tank (1) to one side.



<u>Fig. 30: Locating Vacuum Tank Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt.

Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK** .

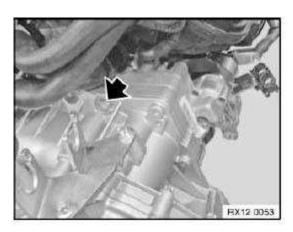


Fig. 31: Locating Bolt Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

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Release nut (2) and remove battery positive lead.

Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK** .

Unfasten screws.

Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK** .

Remove bracket (3) and starter motor.

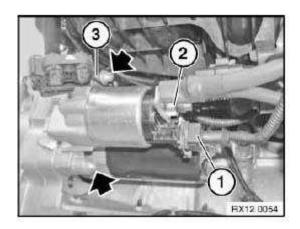


Fig. 32: Identifying Bracket And Starter Motor With Unlock Plug Courtesy of BMW OF NORTH AMERICA, INC.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).

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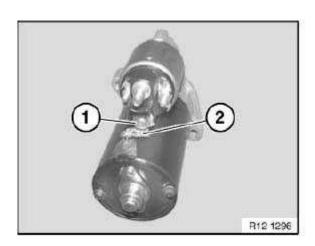


Fig. 33: Identifying Starter Motor Cable Lug And Nut Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.

Tightening torque. Refer to <u>ENGINE ELECTRICAL SYSTEM - TIGHTENING</u> TORQUES -- 2007 HATCHBACK.

Release screws (1).

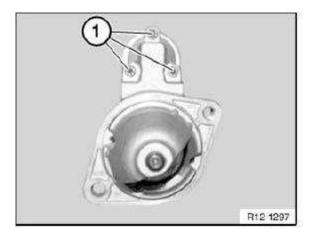


Fig. 34: Identifying Starter Motor Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove solenoid switch (1) and spring (2).

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.

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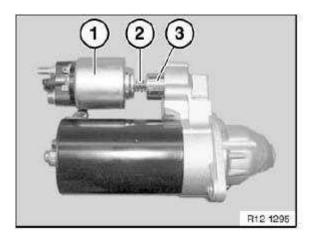


Fig. 35: Identifying Solenoid Switch And Spring With Unhook Pin Courtesy of BMW OF NORTH AMERICA, INC.

42 STARTER LEAD

12 42 500 REPLACING BATTERY POSITIVE LEAD (BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL)

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition
- Disconnect battery negative lead
- Remove air intake hose
- Remove lock bridge
- Disconnect battery positive lead from battery positive terminal. Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM TIGHTENING TORQUES -- 2007 HATCHBACK**.
- Unlock plug on bulkhead and disconnect.

Unlock plug (1) and remove.

Release nut and disconnect battery positive lead (2).

Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK** .

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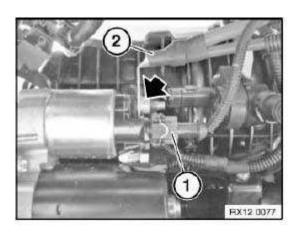


Fig. 36: Identifying Battery Positive Lead And Unlock Plug Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

Release nut and disconnect battery positive lead (2).

Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK** .

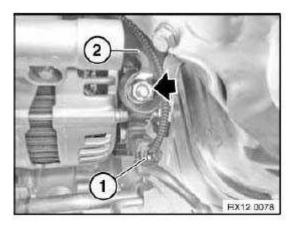


Fig. 37: Locating Battery Positive Lead Nut Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts.

Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES -- 2007 HATCHBACK** .

Feed out air wiring harness (1) and remove.

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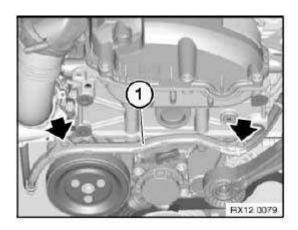


Fig. 38: Locating Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages. Now clear the fault memory.

51 ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N12)

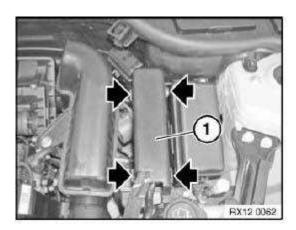
IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection) .

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition
- Disconnect battery negative lead
- Remove intake filter housing

Unlock and remove cover (1).

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<u>Fig. 39: Identifying Control Unit Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unlock the two rear plugs (1) and disconnect.

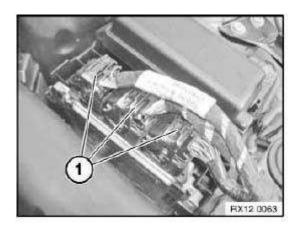


Fig. 40: Identifying Unlock Plug Courtesy of BMW OF NORTH AMERICA, INC.

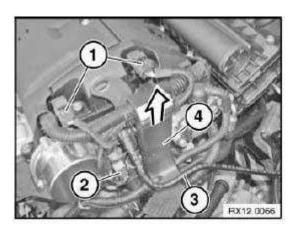
Unlock plugs (1) for camshaft sensors and disconnect.

Unlock plug (2) for oil pressure sensor and disconnect.

Unlock and detach vacuum line (3).

Detach cable duct (4) upwards from holder.

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<u>Fig. 41: Detaching Cable Duct</u> Courtesy of BMW OF NORTH AMERICA, INC.

WORK STEP CHART

Work step	Note:
Unlock plug for coolant temperature sensor and disconnect	
Unlock plug on coolant thermostat and disconnect	
Unlock plug for eccentric shaft sensor and	
disconnect	
Unlock plugs for ignition coils and disconnect	
Disconnect ground connection at cylinder head	Tightening torque 12 51 1AZ.
Unlock plug for front solenoid valve and disconnect	
Unlock plug for control and monitor sensors and	
disconnect	
Unlock plug for eccentric shaft positioning motor	
and disconnect	
Unlock plugs for fuel injectors and disconnect	
Unlock plug for differential pressure sensor and	
disconnect	
Unlock plug for knock sensor and disconnect	
Unlock plug for tank vent valve and disconnect	
Unlock plug for crankshaft sensor and disconnect	
Unlock plug for throttle valve assembly and	
disconnect	
Unlock plug for rear solenoid valve and disconnect	
Unlock plug for friction gear and disconnect	

NOTE: Check stored fault messages.

Now clear the fault memory.

61 OIL PRESSURE-OIL TEMPERATURE

2007 ENGINE Engine Electrical System - Repair Instructions - Cooper

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N12)

Special tools required:

11 7 020

WARNING: Scalding hazard!
Only perform this task on an engine that has cooled down.

Necessary preliminary tasks:

• Switch off ignition

Installation location:

On cylinder head, left.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.

Release screw.

Pull intake muffler (1) towards top and detach clean air pipe (2).

Detach intake muffler (1) from air filter housing and remove.

Remove clean air pipe (2).

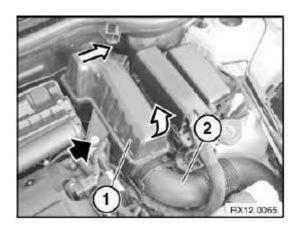


Fig. 42: Detaching Intake Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach plugs (1 and 2).

Unlock and disconnect line (3).

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Carefully pull cable duct (4) upwards slightly.

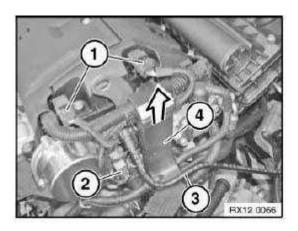
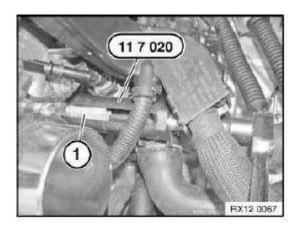


Fig. 43: Detaching Cable Duct Courtesy of BMW OF NORTH AMERICA, INC.

Release oil pressure sensor (1) with special tool 11 7 020.

Installation:

- Replace sealing ring.
- Tightening torque. Refer to **ENGINE ELECTRICAL SYSTEM TIGHTENING TORQUES -- 2007 HATCHBACK** .
- Check engine oil level, top up engine oil if necessary.



<u>Fig. 44: Identifying Special Tool (11 7 020) On Oil Pressure Sensor</u> Courtesy of BMW OF NORTH AMERICA, INC.

62 COOLANT TEMPERATURE

12 62 500 REPLACING COOLANT TEMPERATURE SENSOR (N12)

2007 ENGINE Engine Electrical System - Repair Instructions - Cooper

WARNING: Danger of scalding! Only carry out work on the cooling system after the engine has cooled down!

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Check stored fault messages
- Switch off ignition

Installation location:

On cylinder head, left.

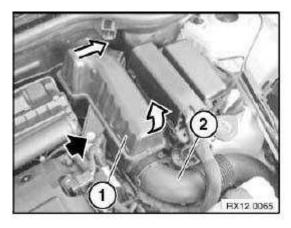
Coolant can escape when temperature sensor is being replaced. Catch and dispose of coolant.

Release screw.

Pull intake muffler (1) towards top and detach clean air pipe (2).

Detach intake muffler (1) from air filter housing and remove.

Remove clean air pipe.



<u>Fig. 45: Detaching Intake Muffler</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach plugs (1 and 2).

Unlock and disconnect line (3).

Carefully pull cable duct (4) upwards slightly.

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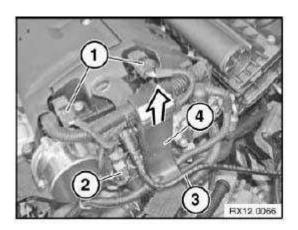


Fig. 46: Detaching Cable Duct Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

Detach lock (2) and remove temperature sensor (3).

Installation:

- Replace sealing ring
- If necessary, add coolant
- Check cooling system for water leaks

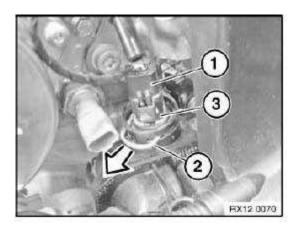


Fig. 47: Detaching Lock Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

2007 ENGINE Engine and Gearbox Suspension - Repair Instructions - Cooper

2007 ENGINE

Engine and Gearbox Suspension - Repair Instructions - Cooper

11 ENGINE SUSPENSION

22 11 001 REPLACING RIGHT ENGINE MOUNT

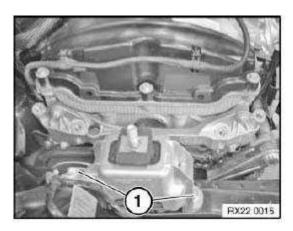
Necessary preliminary tasks:

• Remove right engine support bracket, see <u>22 11 070 Removing and installing/replacing engine</u> mounting bracket

Release screws (1).

Tightening torque: 22 11 4AZ, see **22 11 ENGINE SUSPENSION**

Remove engine mount.



<u>Fig. 1: Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

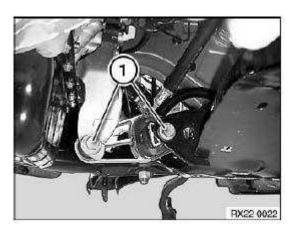
22 11 045 REPLACING LOWER ENGINE CARRIER BRACKET

IMPORTANT: Support engine with transmission lifter.

Release bolts (1) and remove engine carrier bracket.

Tightening torque: 22 11 6AZ/9AZ, see 22 11 ENGINE SUSPENSION

2007 ENGINE Engine and Gearbox Suspension - Repair Instructions - Cooper



<u>Fig. 2: Lower Engine Carrier Bracket Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

22 11 055 REPLACING LOWER ENGINE CARRIER BRACKET HOLDER

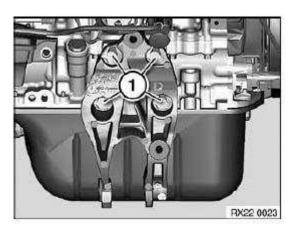
Necessary preliminary tasks:

- Remove lower engine carrier bracket.
- Remove right output shaft.

Release screws.

Tightening torque: 22 11 5AZ, see **22 11 ENGINE SUSPENSION**

NOTE: Illustration similar.



<u>Fig. 3: Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

22 11 070 REMOVING AND INSTALLING/REPLACING ENGINE MOUNTING BRACKET

Necessary preliminary tasks:

2007 ENGINE Engine and Gearbox Suspension - Repair Instructions - Cooper

- In assembly position
- Support engine and transmission with car jack

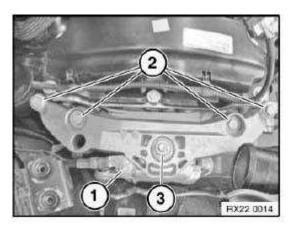
Release nut (1) and remove grounding strap.

Tightening torque: 22 11 7AZ, see **22 11 ENGINE SUSPENSION**

Release screws (2) and nuts (3).

Tightening torque: 22 11 1AZ/2AZ, see 22 11 ENGINE SUSPENSION

Remove engine support bracket.



<u>Fig. 4: Nuts And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

22 11 080 REMOVING AND INSTALLING/REPLACING ADAPTER PLATE

Necessary preliminary tasks:

• Remove engine mounting bracket, see 22 11 070 Removing and installing/replacing engine mounting bracket

Release screws (1).

Tightening torque: 22 11 3AZ, see 22 11 ENGINE SUSPENSION

2007 ENGINE Engine and Gearbox Suspension - Repair Instructions - Cooper

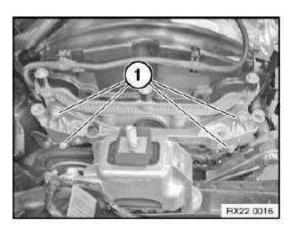


Fig. 5: Screws
Courtesy of BMW OF NORTH AMERICA, INC.

31 TRANSMISSION SUSPENSION (MAN.)

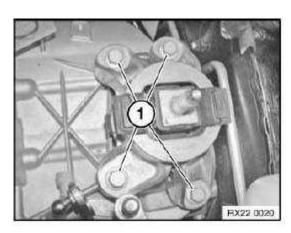
22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary tasks:

• Remove transmission support bracket, see <u>22 31 005 Removing and installing/replacing transmission</u> support bracket

Release screws (1).

Tightening torque: 22 32 1AZ, see 22 32 TRANSMISSION MOUNTS



<u>Fig. 6: Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

22 31 005 REMOVING AND INSTALLING/REPLACING TRANSMISSION SUPPORT BRACKET

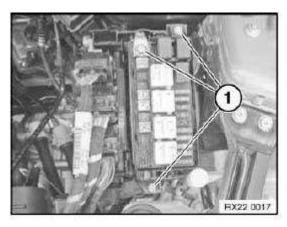
Necessary preliminary tasks:

2007 ENGINE Engine and Gearbox Suspension - Repair Instructions - Cooper

- Disconnect battery, see <u>61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD</u>
- Remove intake filter housing, see 13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N52K)
- Remove control unit, see 12 14 550 REPLACING CONTROL UNIT (DME)
- Support engine and gearbox

Release screws (1).

Push fuse box to one side.



<u>Fig. 7: Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove holder (2).

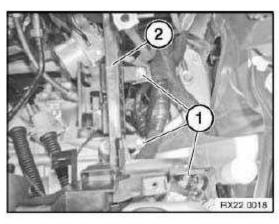


Fig. 8: Screws And Holder Courtesy of BMW OF NORTH AMERICA, INC.

2007 ENGINE Engine and Gearbox Suspension - Repair Instructions - Cooper

Release screws (1).

Tightening torque: 22 32 2AZ, see **22 32 TRANSMISSION MOUNTS**

Slacken nut (2).

Tightening torque: 22 32 3AZ, see **22 32 TRANSMISSION MOUNTS**

Remove transmission support bracket.

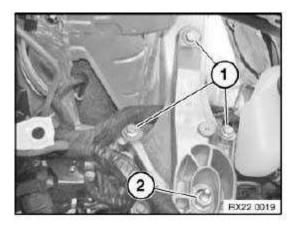


Fig. 9: Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

2007 ENGINE Exhaust System - Repair Instructions - Cooper S

2007 ENGINE

Exhaust System - Repair Instructions - Cooper S

00 EXHAUST SYSTEM, COMPLETE

18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N14)

WARNING: Danger of burning and other injuries!

These tasks should only be carried out on an exhaust system that has

cooled down.

Removal of the exhaust system must be carried out with the assistance of

a second person.

Unfasten clip.

Tightening torque: 18 31 5AZ, see 18 31 EXHAUST SYSTEM, COMPLETE

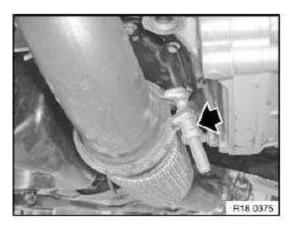


Fig. 1: Locating Clip Courtesy of BMW OF NORTH AMERICA, INC.

Spray rubber mount (1) with antiseize agent and detach from rear muffler (2).

NOTE: Illustration shows and text refers to the left rubber mount.

The procedure is identical for the right filter side.

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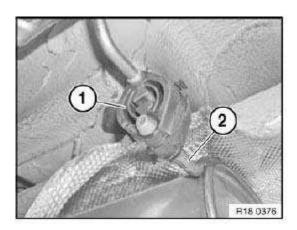


Fig. 2: Rubber Mount And Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

Spray rubber mount (1) with antiseize agent and detach from exhaust pipe (2).

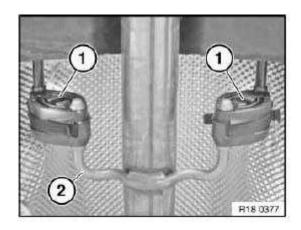


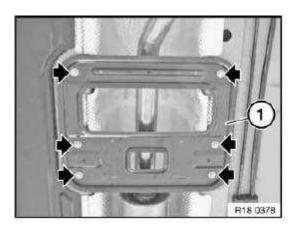
Fig. 3: Rubber Mount With Exhaust Pipe Courtesy of BMW OF NORTH AMERICA, INC.

Support exhaust system with a suitable lifter.

Release screws and remove cross-brace (1).

Lower and remove exhaust system with assistance of a second person.

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<u>Fig. 4: Locating Cross-Brace</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check rubber mount for damage, replace if necessary.

12 MUFFLERS, PETROL

18 12 030 REMOVING AND INSTALLING/REPLACING REAR MUFFLER (N12, N14)

Special tools required:

• 00 2 210

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Cutting line (1) for rear muffler is designated by a notch in the pipe.

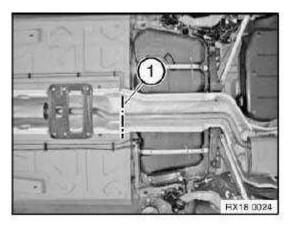


Fig. 5: Line For Rear Muffler Notch In Pipe Courtesy of BMW OF NORTH AMERICA, INC.

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Cut exhaust pipe with special tool 00 2 210 at marked point and deburr.

IMPORTANT: Risk of damage!

Secure exhaust pipe of rear muffler against falling down with assistance of a second person.

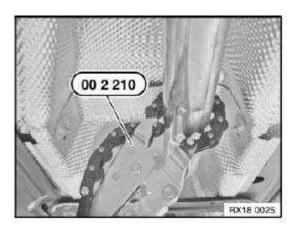


Fig. 6: Exhaust Pipe With Special Tool (00 2 210) Courtesy of BMW OF NORTH AMERICA, INC.

Spray rubber mount (1) with antiseize agent and detach from rear muffler (2).

NOTE: Illustration shows and text refers to the right rubber mount. The procedure is identical for the left side.

Lower and remove rear muffler with assistance of a second person.

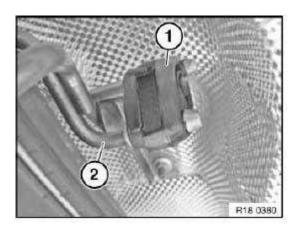


Fig. 7: Rubber Mount With Rear Muffler Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

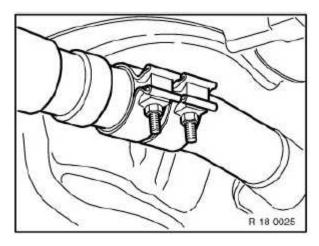
Connect rear muffler to front muffler by means of a clamp.

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Align rear muffler to rear apron.

Align clamp and tighten down.

Tightening torque: 18 31 6AZ, see 18 31 EXHAUST SYSTEM, COMPLETE



<u>Fig. 8: Rear Muffler To Front Muffler With Clamp</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 12 040 REMOVING AND INSTALLING/REPLACING FRONT MUFFLER (N12, N14)

Special tools required:

• 00 2 210

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Unfasten clip.

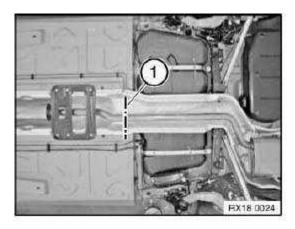
Tightening torque: 18 31 5AZ, see **18 31 EXHAUST SYSTEM, COMPLETE**

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Fig. 9: Exhaust System Clip Courtesy of BMW OF NORTH AMERICA, INC.

Cutting line (1) for front muffler is designated by a notch in the pipe.



<u>Fig. 10: Line For Rear Muffler Notch In Pipe</u> Courtesy of BMW OF NORTH AMERICA, INC.

Cut exhaust pipe with special tool 00 2 210 at marked point and deburr.

IMPORTANT: Risk of damage!

Secure exhaust pipe of rear muffler against falling down.

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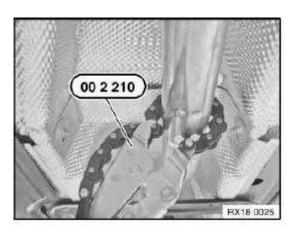


Fig. 11: Special Tool (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Spray rubber mount (1) with antiseize agent and detach from exhaust pipe (2).

NOTE: Check rubber mount for damage, replace if necessary.

Lower and remove front muffler with assistance of a second person.

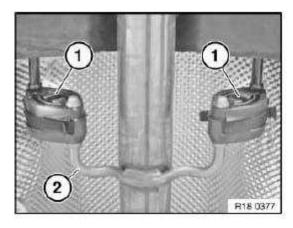


Fig. 12: Rubber Mount With Exhaust Pipe Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

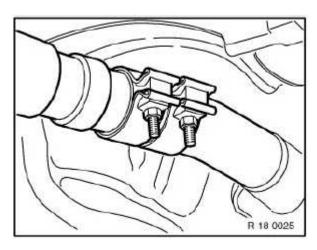
Connect rear muffler to front muffler by means of a clamp.

Align rear muffler to rear apron.

Align clamp and tighten down.

Tightening torque: 18 31 6AZ, see 18 31 EXHAUST SYSTEM, COMPLETE

2007 ENGINE Exhaust System - Repair Instructions - Cooper S



<u>Fig. 13: Rear Muffler To Front Muffler With Clamp</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

32 EXHAUST CATALYTIC CONVERTER

18 32 005 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER (N14)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

Move front panel into assembly position, see <u>41 33 600 MOVING FRONT PANEL INTO ASSEMBLY POSITION</u>

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove control sensor, see 11 78 510 REPLACING OXYGEN SENSOR

Remove monitor sensor

Release screw and remove holder (1).

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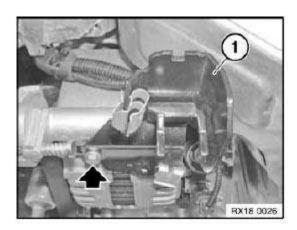
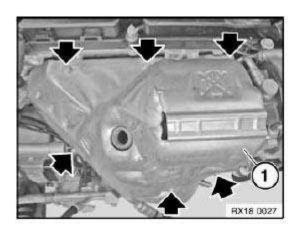


Fig. 14: Holder And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove upper heat shield (1).

Tightening torque: 11 65 7AZ, see 11 65 TURBOCHARGER AND CONTROL



<u>Fig. 15: Upper Heat Shield And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove lower heat shield (1).

Tightening torque: 11 65 7AZ, see <u>11 65 TURBOCHARGER AND CONTROL</u>

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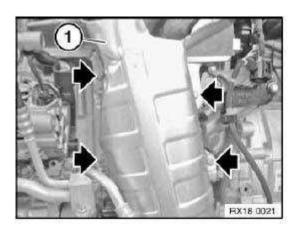


Fig. 16: Lower Heat Shield And Screw Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Installation:

Replace nuts.

Tightening torque: 18 31 53AZ, see 18 31 EXHAUST SYSTEM, COMPLETE

Unscrew nuts (1).

Tightening torque: 18 31 4AZ, see 18 31 EXHAUST SYSTEM, COMPLETE

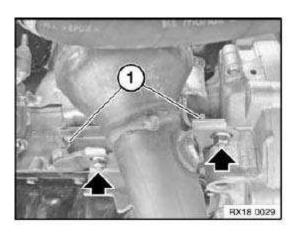


Fig. 17: Lower Heat Shield Nuts Courtesy of BMW OF NORTH AMERICA, INC.

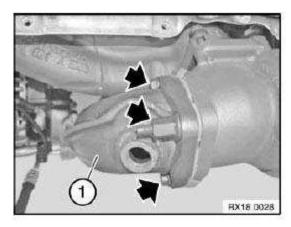
Loosen screws and nut.

Remove exhaust manifold (1).

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Installation:

- Replace seal.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque: 18 31 1AZ, see 18 31 EXHAUST SYSTEM, COMPLETE



<u>Fig. 18: Holder And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

40 EXHAUST MANIFOLD WITH

18 40 040 REMOVING AND INSTALLING/REPLACING EXHAUST MANIFOLD (N14)

Special tools required:

• 17 2 051

WARNING: Scalding hazard!

These tasks should only be carried out on an exhaust system that has cooled down.

Necessary preliminary tasks:

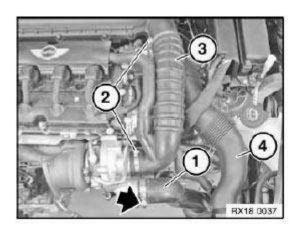
- Drain coolant
- Remove coolant expansion tank
- Remove catalytic exhaust-gas converter

Release clamp and detach charge-air duct (1).

Release clamps (2) and detach air intake hose (3).

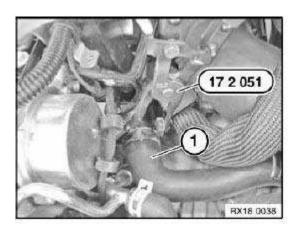
Remove clean air pipe (4).

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<u>Fig. 19: Locating Air Pipe, Clamps And Charge-Air Duct</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release spring strap with special tool 17 2 051 and detach coolant hose (1).



<u>Fig. 20: Locating Turbocharger From Exhaust Manifold</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and detach lines (1).

Installation:

Replace seals.

Tightening torque: 11 65 8AZ, see 11 65 TURBOCHARGER AND CONTROL

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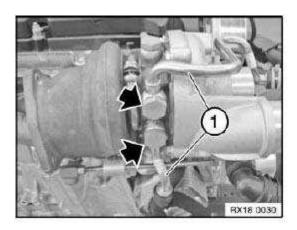


Fig. 21: Detaching Lines And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off hose (1).

Unlock connector (2) and remove.

Unscrew bolt (3).

Release spring strap with special tool 17 2 051. Detach line (4) and remove.

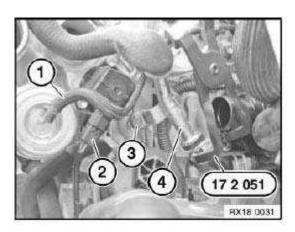


Fig. 22: Spring Strap With Special Tool (17 2 051) Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and detach line (2).

Installation:

Replace seals.

Tightening torque: 11 65 4AZ, see 11 65 TURBOCHARGER AND CONTROL

2007 ENGINE Exhaust System - Repair Instructions - Cooper S

Release screw (3) and detach line (4).

Installation:

Replace sealing ring.

Tightening torque: 11 65 5AZ, see 11 65 TURBOCHARGER AND CONTROL

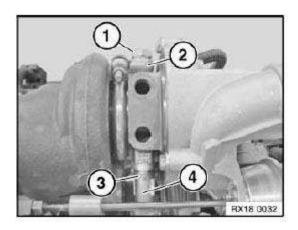


Fig. 23: Detach Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: 11 65 3AZ, see 11 65 TURBOCHARGER AND CONTROL

Release screw (2) and remove holder (3).

Tightening torque: 11 65 6AZ, see 11 65 TURBOCHARGER AND CONTROL

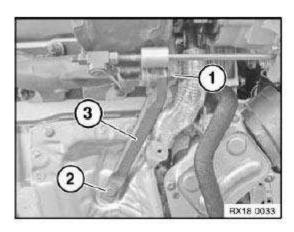


Fig. 24: Holder And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

2007 ENGINE Exhaust System - Repair Instructions - Cooper S

Release nuts and remove exhaust manifold (1).

Installation:

- Replace seal and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque: 18 40 1AZ, see 18 40 EXHAUST SYSTEM, COMPLETE

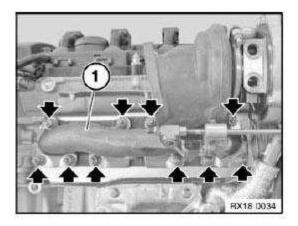
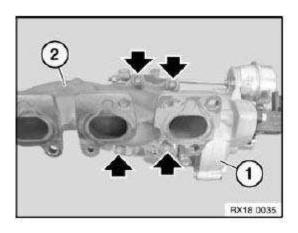


Fig. 25: Locating Exhaust Manifold And Nuts Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and remove turbocharger (1) from exhaust manifold (2).

Installation:

- Replace seal and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque: 11 65 1AZ, see 11 65 TURBOCHARGER AND CONTROL



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<u>Fig. 26: Locating Turbocharger From Exhaust Manifold</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

Assemble engine. Top up coolant. Check engine oil level. Clear DME fault memory.

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2007 ENGINE

Exhaust System - Repair Instructions - Cooper

00 EXHAUST SYSTEM, COMPLETE

18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N12)

WARNING: Danger of burning and other injuries!

These tasks should only be carried out on an exhaust system that has

cooled down.

Removal of the exhaust system must be carried out with the assistance of

a second person.

Unfasten clip.

Tightening torque: 18 31 5AZ, see 18 31 EXHAUST SYSTEM, COMPLETE



Fig. 1: Locating Clip Courtesy of BMW OF NORTH AMERICA, INC.

Spray rubber mount (1) with antiseize agent and detach from rear muffler (2).

NOTE: Illustration shows and text refers to the right rubber mount.

The procedure is identical for the left side.

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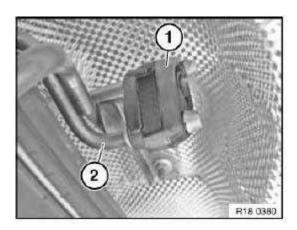


Fig. 2: Mount And Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

Spray rubber mount (1) with antiseize agent and detach from exhaust pipe (2).

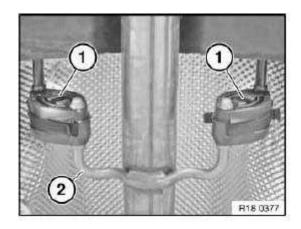


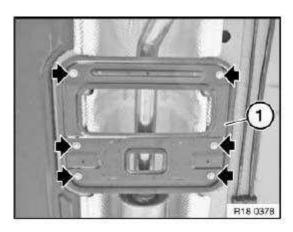
Fig. 3: Rubber Mount And Exhaust Pipe Courtesy of BMW OF NORTH AMERICA, INC.

Support exhaust system with a suitable lifter.

Release screws and remove cross-brace (1).

Lower and remove exhaust system with assistance of a second person.

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<u>Fig. 4: Locating Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check rubber mount for damage, replace if necessary.

12 MUFFLERS, PETROL

18 12 030 REMOVING AND INSTALLING/REPLACING REAR MUFFLER (N12, N14)

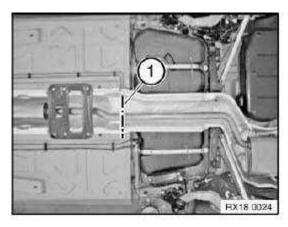
Special tools required:

• <u>00 2 210 EXHAUST PIPE CUTTER</u>

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Cutting line (1) for rear muffler is designated by a notch in the pipe.



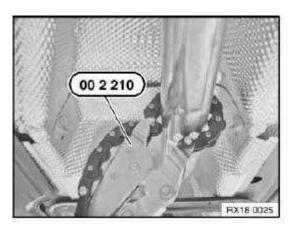
<u>Fig. 5: Line For Rear Muffler</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Cut exhaust pipe with special tool 00 2 210 at marked point and deburr.

IMPORTANT: Risk of damage!

Secure exhaust pipe of rear muffler against falling down with assistance of a second person.



<u>Fig. 6: Special Tools (00 2 210)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Spray rubber mount (1) with antiseize agent and detach from rear muffler (2).

NOTE: Illustration shows and text refers to the right rubber mount. The procedure is identical for the left side.

Lower and remove rear muffler with assistance of a second person.

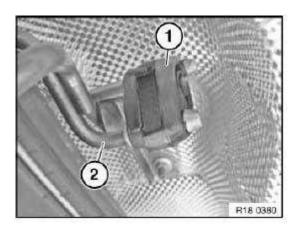


Fig. 7: Mount And Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect rear muffler to front muffler by means of a clamp.

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Align rear muffler to rear apron.

Align clamp and tighten down.

Tightening torque: 18 31 6AZ, see 18 31 EXHAUST SYSTEM, COMPLETE

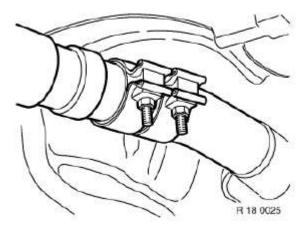


Fig. 8: Connecting Rear Muffler To Front Muffler By Clamp Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 12 040 REMOVING AND INSTALLING/REPLACING FRONT MUFFLER (N12, N14)

Special tools required:

• <u>00 2 210 EXHAUST PIPE CUTTER</u>

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Unfasten clip.

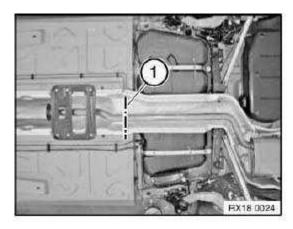
Tightening torque: 18 31 5AZ, see <u>18 31 EXHAUST SYSTEM, COMPLETE</u>

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<u>Fig. 9: Locating Clip</u> Courtesy of BMW OF NORTH AMERICA, INC.

Cutting line (1) for front muffler is designated by a notch in the pipe.



<u>Fig. 10: Line For Front Muffler</u> Courtesy of BMW OF NORTH AMERICA, INC.

Cut exhaust pipe with special tool 00 2 210 at marked point and deburr.

IMPORTANT: Risk of damage!

Secure exhaust pipe of rear muffler against falling down.

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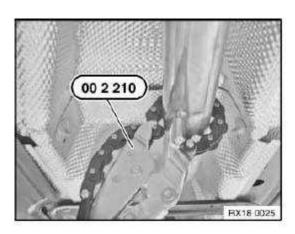


Fig. 11: Special Tools (00 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Spray rubber mount (1) with antiseize agent and detach from exhaust pipe (2).

NOTE: Check rubber mount for damage, replace if necessary.

Lower and remove front muffler with assistance of a second person.

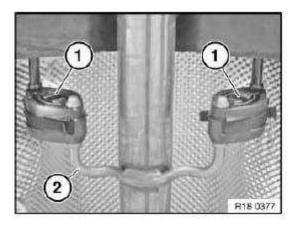


Fig. 12: Rubber Mount And Exhaust Pipe Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect rear muffler to front muffler by means of a clamp.

Align rear muffler to rear apron.

Align clamp and tighten down.

Tightening torque: 18 31 6AZ, see 18 31 EXHAUST SYSTEM, COMPLETE

2007 ENGINE Exhaust System - Repair Instructions - Cooper

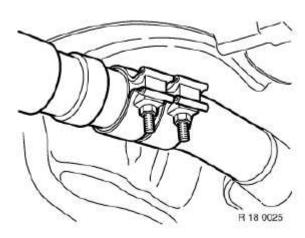


Fig. 13: Connecting Rear Muffler To Front Muffler By Clamp Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

40 EXHAUST MANIFOLD

18 40 040 REMOVING AND INSTALLING/REPLACING EXHAUST MANIFOLD (N12)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

Move front panel into assembly position, see <u>41 33 600 MOVING FRONT PANEL INTO ASSEMBLY POSITION</u>

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

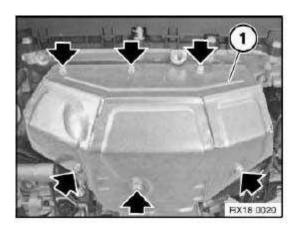
Remove control sensor, see 11 78 510 REPLACING OXYGEN SENSOR

Remove monitor sensor, see <u>11 78 610 REMOVING AND INSTALLING/REPLACING MONITOR SENSOR (N12)</u>

Release screws and remove upper heat shield (1).

Tightening torque: 11 65 7AZ, see 11 65 TURBOCHARGER AND CONTROL

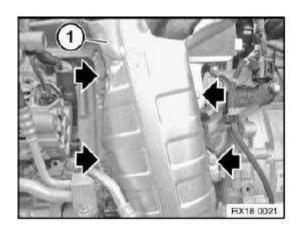
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<u>Fig. 14: Locating Upper Heat Shield Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove lower heat shield (1).

Tightening torque: 11 65 7AZ, see 11 65 TURBOCHARGER AND CONTROL



<u>Fig. 15: Locating Lower Heat Shield Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

Tightening torque: 18 40 3AZ, see 18 40 EXHAUST SYSTEM, COMPLETE

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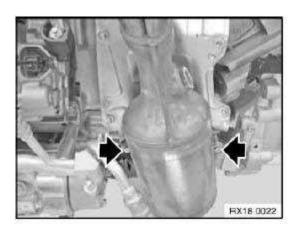


Fig. 16: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and remove exhaust manifold (1).

Installation:

- Replace seal and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque: 18 40 1AZ, see 18 40 EXHAUST SYSTEM, COMPLETE

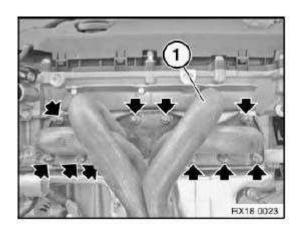


Fig. 17: Locating Exhaust Manifold Nuts Courtesy of BMW OF NORTH AMERICA, INC.

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2007 SUSPENSION

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00 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- o Diarrhoea
- o Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

• Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

- Impaired sight
- o Irritation of the eyes
- Reddening of the skin
- o Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eyerinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

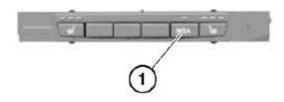
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



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Fig. 1: Identifying Button Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

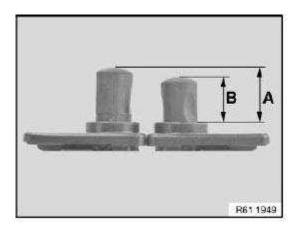


Fig. 2: Identifying Engine Hood Dimension Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

NOTE: For further information on automatic engine start-stop system (MSA), refer to appropriate Service Information.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: Danger of poisoning if oil is ingested/absorbed through the skin! Risk of injury if oil comes into contact with eyes and skin!

Recycling:

Observe country-specific waste-disposal regulations.

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Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00 RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

- 1. Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.
- 2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
- 3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

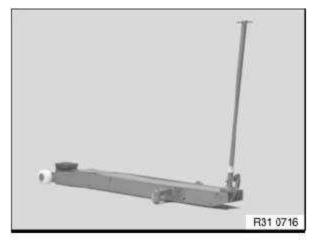
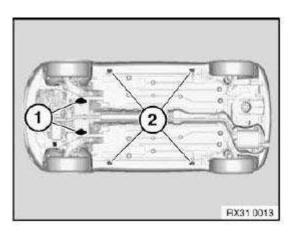


Fig. 3: Identifying Trolley Jacks
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

- 1. Side of front axle subframe
- 2. Side car jacking points

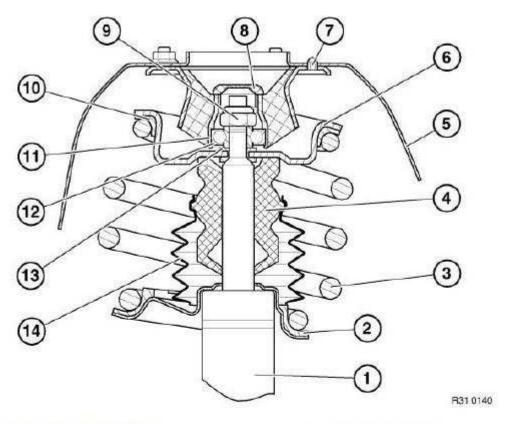
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<u>Fig. 4: Identifying Vehicle Jacking Points</u> Courtesy of BMW OF NORTH AMERICA, INC.

31 LAYOUT OF SPRING STRUT SHOCK ABSORBER

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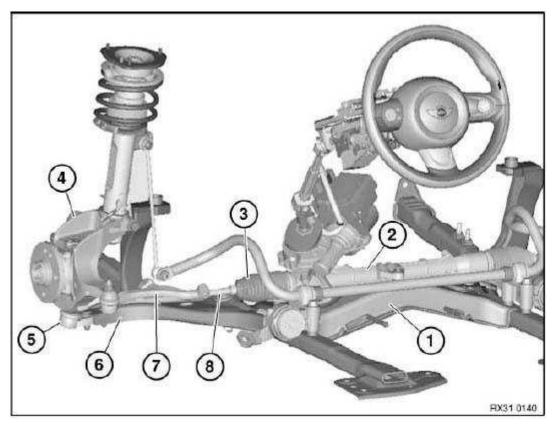


- 1 Spring strut shock absorber
- 2 Lower spring pad
- 3 Coil spring
- 4 Auxiliary spring
- 5 Wheel arch
- 6 Upper spring plate
- 7 Centering pin
- 8 Grease cap
- 9 Nut

- 10 Upper spring pad
- 11 Thrust bearing
- 12 Dust sleeve
- 13 Thrust washer/shim
- 14 Rubber gaiter

<u>Fig. 5: Layout Of Spring Strut Shock Absorber</u> Courtesy of BMW OF NORTH AMERICA, INC.

31 00 ... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK



<u>Fig. 6: Identifying Front Axle + Steering Components</u> Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check must be carried out after the following work:

- Release of following screw/bolt connections:
 - Steering gear to front axle carrier
 - Wheel control joint to control arm
 - Tie rod end to tie rod
- Replacement of following parts:
 - 1. Front axle carrier
 - 2. Steering gear
 - 3. Gaiter (if the tie rod end has to be screwed off)
 - 4. Swivel bearing
 - 5. Wheel guide joint
 - 6. Control arm
 - 7. Tie rod end
 - 8. Tie rod

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Facts:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

31 00 ... NOTES ON REPAIRING THREADS

IMPORTANT: Install Heli-coil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in engine carrier may be repaired with Heli-coil thread inserts. Comply with the procedure described in the example.

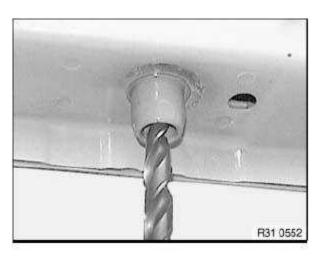


Fig. 7: Identifying Heli-coil Thread Courtesy of BMW OF NORTH AMERICA, INC.

Procedure:

1. Create a clean core hole; if necessary, drill out screw remnants

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<u>Fig. 8: Drilling Out Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

2. Create locating thread for Heli-coil thread insert



Fig. 9: Identifying Heli-coil Thread Insert Courtesy of BMW OF NORTH AMERICA, INC.

3. Pick out Heli-coil thread insert in accordance with the table and screw into the locating thread until flush with the original thread

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Fig. 10: Locating Thread **Courtesy of BMW OF NORTH AMERICA, INC.**

4. Break drive pin and remove



Fig. 11: Breaking Drive Pin Courtesy of BMW OF NORTH AMERICA, INC.

51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM

Special tools required:

- 00 2 261
- 00 2 262

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down.

Observe the following directions and instructions when handling the

special tool:

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- 1. Prior to each use, check the special tools for defects, modifications and operational reliability.
- 2. Damaged/modified special tools must not be used!
- 3. No changes or modifications may be made to the special tools!
- 4. Keep special tools dry, clean and free of grease.
- 5. Impact screwdrivers may not be used!

IMPORTANT: Risk of corrosion!

Touch up paintwork damage. Re-establish wax layer.

Remove vehicle jack fixture with a suitable tool from side frame.

Installation:

Check fixture for damage, replace if necessary.

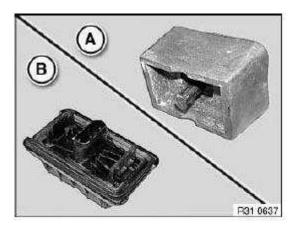


Fig. 12: Identifying Fixture Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Following states can be selected on special tool 00 2 261.

- A. Vehicle unsecured
- B. Vehicle secured (after special tool is lashed to lifting platform arm)

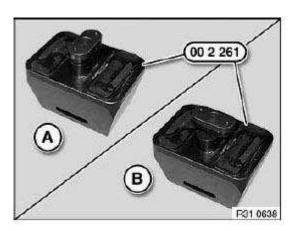


Fig. 13: Identifying Special Tool (00 2 261) Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following procedure must always be carried out on the left and right sides.

Insert special tool 00 2 261 into opening in side frame with 3/8" extension and secure ratchet to body. To do so, turn lock through 90° up to stop.

WARNING: Danger to life!

Check stopping of special tool 00 2 261 on side frame, correct attachment if necessary.

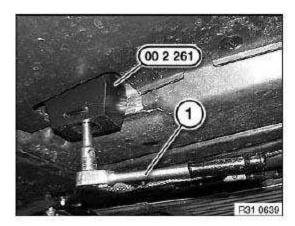


Fig. 14: Identifying Special Tool (00 2 261) Courtesy of BMW OF NORTH AMERICA, INC.

Lash special tool 00 2 261 with tensioning strap 00 2 262 crosswise (as pictured) to lifting platform arm.

WARNING: Danger to life!

Carry out tensile and visual inspection of tensioning strap 00 2 262,

correct position if necessary.

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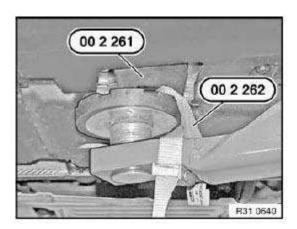


Fig. 15: Identifying Special Tool (00 2 261) And (00 2 262) Courtesy of BMW OF NORTH AMERICA, INC.

11 FRONT SUB-FRAME

31 11 001 REPLACING FRONT AXLE CARRIER

Special tools required:

- 00 2 040
- 31 1 040
- 31 2 310
- 31 4 051
- 31 4 090
- 32 3 090

Necessary preliminary tasks:

- Remove wheels
- Remove exhaust system
- Remove front bumper trim
- Remove underbody panelling on left and right
- If necessary, disconnect plug connection from ride-height sensor

After installation:

• Carry adjustment of steering torque sensor with BMW Diagnosis and Information System (DIS).

WARNING: Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

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When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Release screw (1) and swing lower steering spindle section (2) towards rear.

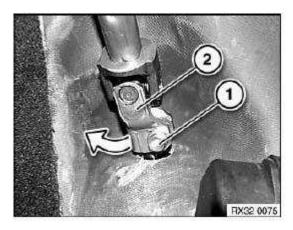
IMPORTANT: Make sure that the steering wheel is not moved when the steering spindle is removed.

Risk of damage to airbag coil spring.

Installation:

Replace screw (1).

Tightening torque. Refer to <u>STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES - 2007</u> HATCHBACK.



<u>Fig. 16: Identifying Screw And Swing Lower Steering Spindle Section</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on support joint on left and right.

Press support joint with special tool 31 2 310 out of swivel bearing.

Installation:

Replace self-locking nuts.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

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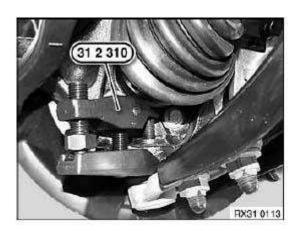


Fig. 17: Identifying Special Tool (31 2 310)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on tie rod end on left and right.

Press tie rod end out of swivel bearing with special tool 32 3 090

Installation:

Replace self-locking nuts.

Tightening torque. Refer to <u>STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES - 2007</u> HATCHBACK.

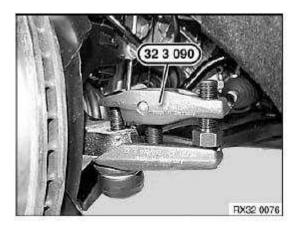


Fig. 18: Identifying Special Tool (32 3 090)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on inner joint of control arm on left and right.

Screw on special tool 31 1 040 and strike joint from below to release from taper.

Installation:

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Replace self-locking nuts.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

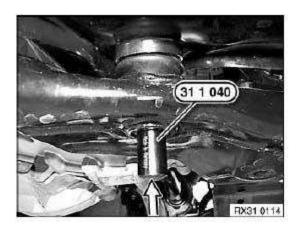


Fig. 19: Identifying Special Tool (31 1 040)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on left and right; if necessary, grip dihedron (2) or hexagon socket.

Installation:

Replace self-locking nuts.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

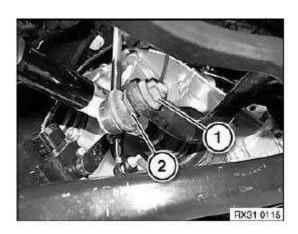


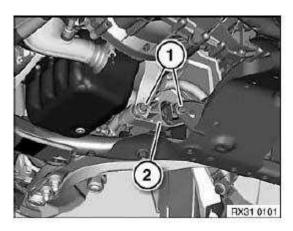
Fig. 20: Identifying Nut And Dihedron Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove stabilizer link (2).

Installation:

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Tightening torque. Refer to **ENGINE AND GEARBOX SUSPENSION - TIGHTENING TORQUES -- 2007 HATCHBACK** .



<u>Fig. 21: Identifying Screws And Stabilizer Link</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) on steering gear.

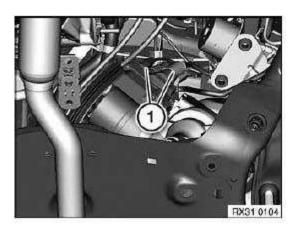


Fig. 22: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on bumper holder on left.

Installation:

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

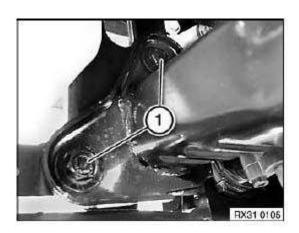


Fig. 23: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on bumper holder on right.

Installation:

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

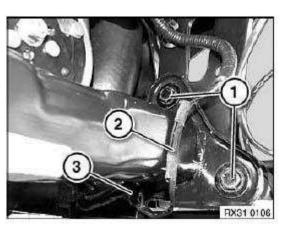
Unclip cable holder (2).

Release cable tie (3).

Installation:

Replace cable tie.

IMPORTANT: Make sure when lowering front axle that cable (2) is not damaged.



<u>Fig. 24: Identifying Cable Holder, Cable Tie And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Position special tool 00 2 040 on workshop jack.

Insert special tool 31 4 051 in each case into rear locators on left and right.

Insert special tool 31 4 090 in each case into front locators on left and right.

IMPORTANT: Journals of special tool 31 4 090 must be inserted completely into bores of front axle carrier!

Support front axle carrier by raising slightly.

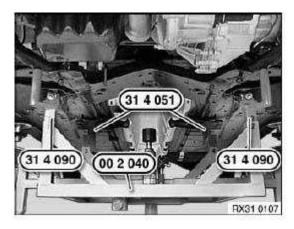


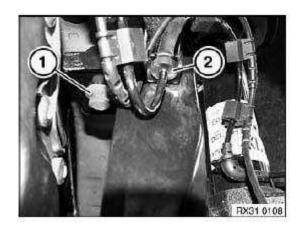
Fig. 25: Identifying Special Tool (00 2 040), (31 4 051) And (31 4 090) Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on left and right.

Remove cable (2) of pulse generator on left and right from mounting.

Installation:

Tightening torque. Refer to **FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK**.



2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Fig. 26: Identifying Cable And Screws Courtesy of BMW OF NORTH AMERICA, INC.

Release left and right screws (1).

Installation:

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Release left and right screws (2).

Installation:

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Lower front axle carrier

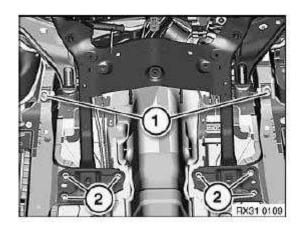


Fig. 27: Identifying Left And Right Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When lowering the front axle carrier, it is absolutely essential to make sure that the control head (1) of the electric steering gear (EPS) does not collide in area (2) with the bulkhead!

Collision with the bulkhead may result in damage to the electric steering gear (EPS)!

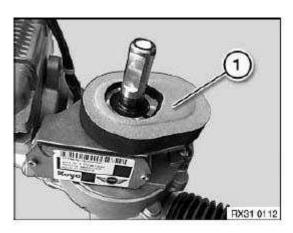
When lowering and raising, make sure there is freedom of movement between front axle carrier, transmission and A/C lines.



Fig. 28: Identifying Control Head And Electric Steering Gear Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Seal (1) of electric steering gear (EPS) must always be replaced.



<u>Fig. 29: Identifying Seal</u> Courtesy of BMW OF NORTH AMERICA, INC.

The following components must be modified when the front axle carrier is replaced:

- Control arm, left and right
- Steering gear
- Stabilizer
- Bumper bracket
- If necessary, ride-height sensor
- Perform CHASSIS ALIGNMENT CHECK

31 11 020 REMOVING AND INSTALLING/REPLACING BUMPER BRACKET

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Necessary preliminary tasks:

• Remove bumper carrier

Release screws (1) and detach bumper bracket towards front from front axle carrier.

Installation:

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

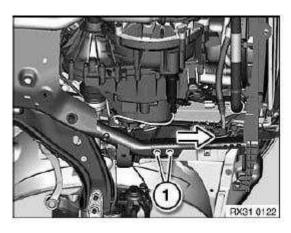


Fig. 30: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

31 11 506 LOWERING/RAISING FRONT AXLE CARRIER

Special tools required:

- 00 2 040
- 31 4 051
- 31 4 090

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down.

When supporting components, make sure that:

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Necessary preliminary tasks:

- Remove wheels
- Remove exhaust system

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

- Remove front bumper trim
- Remove underbody panelling on left and right
- If necessary, disconnect plug connection from ride-height sensor

After installation:

• Carry adjustment of steering torque sensor with BMW Diagnosis and Information System (DIS).

Release screw (1) and swing lower steering spindle section (2) towards rear.

IMPORTANT: Make sure that the steering wheel is not moved when the steering spindle is removed.

Risk of damage to airbag coil spring.

Installation:

Replace screw (1).

Tightening torque. Refer to <u>STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES - 2007</u> **HATCHBACK** .

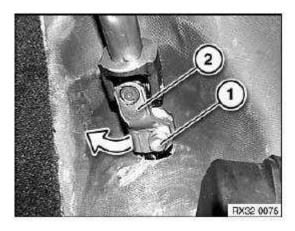


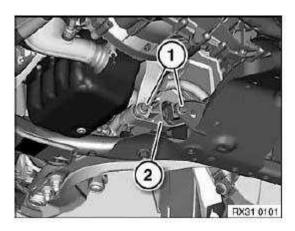
Fig. 31: Identifying Screw And Swing Lower Steering Spindle Section Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove stabilizer link (2).

Installation:

Tightening torque. Refer to **ENGINE AND GEARBOX SUSPENSION - TIGHTENING TORQUES -- 2007 HATCHBACK** .

2007 SUSPENSION Front Axle - Repair Instructions - Cooper



<u>Fig. 32: Identifying Screws And Stabilizer Link</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) on electric steering (EPS).

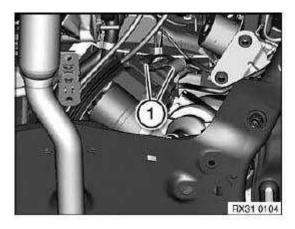


Fig. 33: Identifying Plug Connections Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on bumper holder on left.

Installation:

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

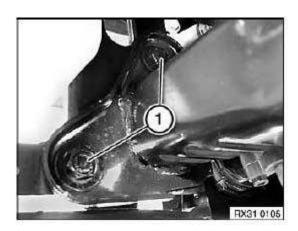


Fig. 34: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on bumper holder on right.

Installation:

Tightening torque. Refer to **BODY EQUIPMENT - TIGHTENING TORQUES -- 2007 HATCHBACK**.

Unclip cable tie (2).

Release cable tie (3).

Installation:

Replace cable ties.

IMPORTANT: Make sure when lowering front axle that cable (2) is not damaged.

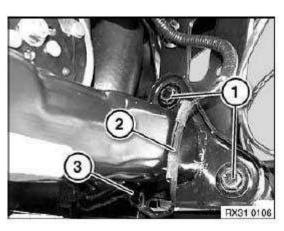


Fig. 35: Identifying Cable Holder, Cable Tie And Screw Courtesy of BMW OF NORTH AMERICA, INC.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Position special tool 00 2 040 on workshop jack.

Insert special tool 31 4 051 in each case into rear locators on left and right.

Insert special tool 31 4 090 in each case into front locators on left and right.

IMPORTANT: Journals of special tool 31 4 090 must be inserted completely into bores of front axle carrier!

Support front axle carrier by raising slightly.

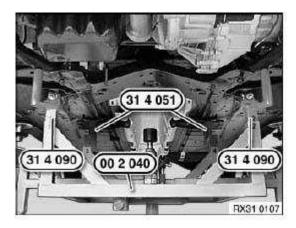


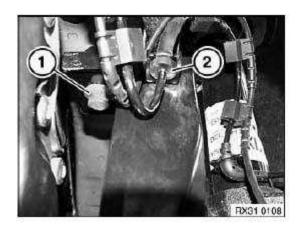
Fig. 36: Identifying Special Tool (00 2 040), (31 4 051) And (31 4 090) Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on left and right.

Installation:

Tightening torque. Refer to **FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK**.

Remove cable (2) of pulse generator on left and right from mounting.



2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Fig. 37: Identifying Cable And Screws Courtesy of BMW OF NORTH AMERICA, INC.

Release left and right screws (1).

Installation:

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Release left and right screws (2).

Installation:

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

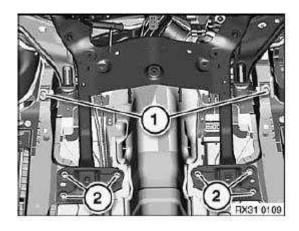


Fig. 38: Identifying Left And Right Screws Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When lowering the front axle carrier, it is absolutely essential to make sure that the control head (1) of the electric steering gear (EPS) does not collide in area (2) with the bulkhead!

Collision with the bulkhead may result in damage to the electric steering gear (EPS)!

When lowering and raising, make sure there is freedom of movement between front axle carrier, transmission and A/C lines.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper



<u>Fig. 39: Identifying Control Head And Electric Steering Gear</u> Courtesy of BMW OF NORTH AMERICA, INC.

Lower front axle carrier until dimension (A) is 120 mm.

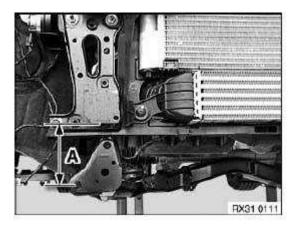


Fig. 40: Identifying Lower Front Axle Carrier Dimension Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Seal (1) of electric steering gear (EPS) must always be replaced.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

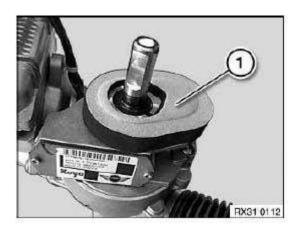


Fig. 41: Identifying Seal Courtesy of BMW OF NORTH AMERICA, INC.

12 STRUTS WITH RUBBER MOUNTS

31 12 000 REMOVING AND INSTALLING LEFT OR RIGHT CONTROL ARM

Special tools required:

- 31 1 040
- 31 2 310

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down.

Necessary preliminary tasks:

• Remove front wheel

Left side only:

Release screw (1).

Remove bracket (3) from control arm.

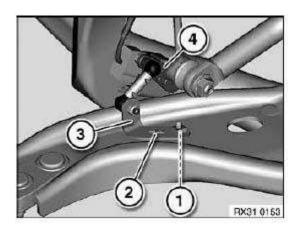
Installation:

Sensor lever (4) must point from ride-height sensor to left front wheel.

Align bracket (3) by way of lug (2) to corresponding opening in control arm.

Tightening torque. Refer to **FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK**.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper



<u>Fig. 42: Identifying Bracket, Lug And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Press control arm off swivel bearing with special tool 31 2 310.

Installation:

Keep control arm to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque. Refer to **FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK**.

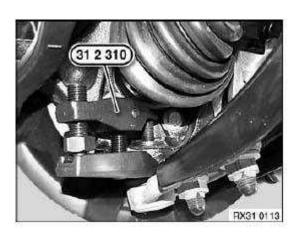


Fig. 43: Identifying Special Tool (31 2 310) Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Screw special tool 31 1 040 onto joint.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Strike joint from below to release it from taper in front axle carrier.

Installation:

Keep control arm to front axle carrier connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

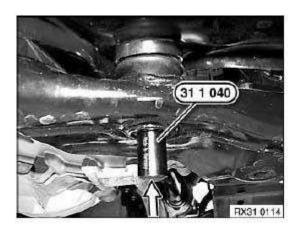
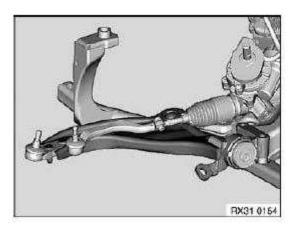


Fig. 44: Identifying Special Tool (31 1 040)
Courtesy of BMW OF NORTH AMERICA, INC.

Lower front axle support.

Remove stabilizer from front axle carrier and tie up.

Remove control arm with bracket from front axle carrier.



<u>Fig. 45: Identifying Control Arm With Bracket</u> Courtesy of BMW OF NORTH AMERICA, INC.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

After installation:

• Carry out steering angle sensor adjustment

31 12 001 REPLACING LEFT OR RIGHT CONTROL ARM

WARNING: The front axle carrier must also be replaced if the control arm is deformed!

Remove control arm.

Replace bracket for control arm.

Installation:

Keep control arm to swivel bearing connection rust-free.

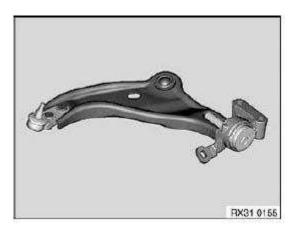


Fig. 46: Identifying Control Arm Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform CHASSIS ALIGNMENT CHECK
- Carry out steering angle sensor adjustment

31 12 024 REPLACING WHEEL GUIDE JOINT IN LEFT OR RIGHT CONTROL ARM

Special tools required:

• 31 2 310

Necessary preliminary tasks:

· Remove wheel

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

• If necessary, remove ride-height sensor

After completing work, carry out electronic wheel alignment check.

Release nut on support joint.

Installation:

Replace self-locking nuts

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Press support joint with special tool 31 2 310 out of swivel bearing.

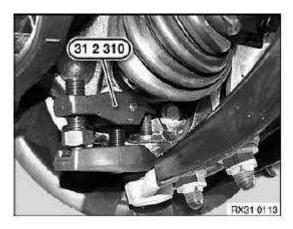


Fig. 47: Identifying Special Tool (31 2 310)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and remove support joint (2).

Installation:

Replace self-locking nuts.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

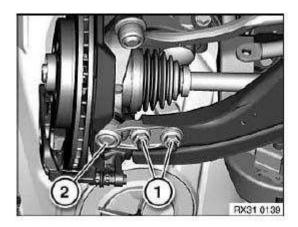


Fig. 48: Identifying Nuts And Support Joint Courtesy of BMW OF NORTH AMERICA, INC.

31 12 046 REPLACING BRACKET FOR LEFT OR RIGHT CONTROL ARM

IMPORTANT: If a bracket is replaced, the rubber mount on the other side must also be replaced.

Never re-use a rubber mount pulled off control arm.

Rubber-coated inner sleeve is destroyed when pulled off dry.

Necessary preliminary tasks:

Remove control arm

Force control arm with a press and a suitable tool out of bracket.

Installation:

Coat control arm pin and rubber mount bushing with Circo Light (sourcing reference: BMW Parts Service).

Lay bracket on work surface of press.

Align control arm to bracket and press from above into bracket (up to stop).

IMPORTANT: Bolt bracket and control arm to front axle support immediately.

Leave car for min. 30 minutes in empty weight position and avoid major spring deflections.

After approx. 30 minutes, the anti-seize agent is fully evaporated and the control arm is firmly seated and correctly positioned in the rubber mount. Non-conformance with these procedures could lead to serious impairment of handling!

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Special tools required:

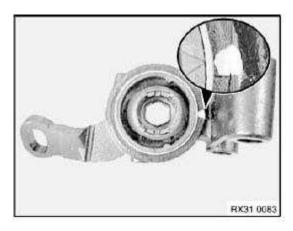
• 31 5 150

IMPORTANT: Always replace rubber mounts in pairs.

Necessary preliminary tasks:

• Remove bracket for control arm

IMPORTANT: Mark alignment of rubber mount to bracket prior to removal.



<u>Fig. 49: Identifying Bracket For Control Arm</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press out rubber mount with special tool 31 5 150 as shown.

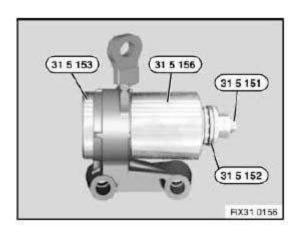


Fig. 50: Identifying Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Arrow on rubber mount must point to marking on bracket.

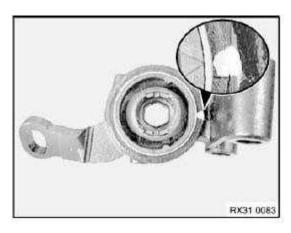


Fig. 51: Identifying Bracket For Control Arm Courtesy of BMW OF NORTH AMERICA, INC.

Press in rubber mount with special tool 31 5 150 as shown.

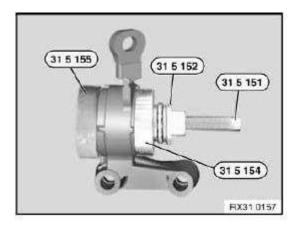


Fig. 52: Identifying Special Tool (31 5 151), (31 5 152) And (31 5 154) Courtesy of BMW OF NORTH AMERICA, INC.

21 WHEEL BEARINGS AND STUB AXLE

31 21 090 REPLACING (REMOVING AND INSTALLING) LEFT OR RIGHT SWIVEL BEARING

Special tools required:

- 31 2 310
- 32 3 090

Necessary preliminary tasks:

• Remove wheel

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

• After releasing outer collar nut, remove brake disc

Release collar nut (1), press brake pedal to floor for this purpose.

Installation:

Replace collar nut.

Tightening torque. Refer to <u>31 60 2AZ INPUT SHAFT</u> output shaft to angular-contact ball bearing.

IMPORTANT: Secure collar nut after tightening down on flattened area (2) of drive shaft by peening.

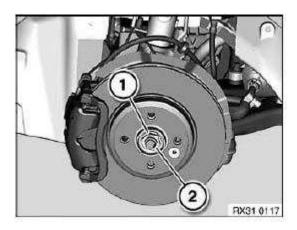


Fig. 53: Identifying Collar Nut Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on tie rod end on left and right.

Installation:

Replace self-locking nuts

Tightening torque. Refer to <u>STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES - 2007 HATCHBACK</u>.

Press tie rod end out of swivel bearing with special tool 32 3 090.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

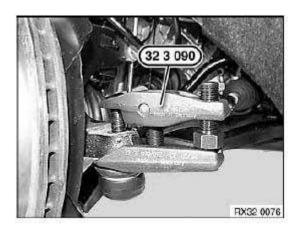


Fig. 54: Identifying Special Tool (32 3 090)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on support joint on left and right.

Installation:

Replace self-locking nuts

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Press support joint with special tool 31 2 310 out of swivel bearing.

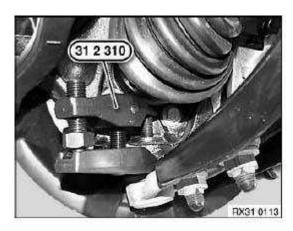


Fig. 55: Identifying Special Tool (31 2 310)
Courtesy of BMW OF NORTH AMERICA, INC.

Press swivel bearing (1) outwards and feed output shaft (2) out of wheel hub spline teeth.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

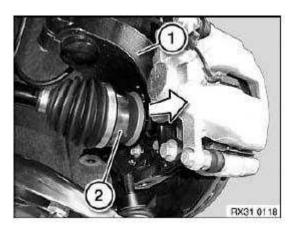


Fig. 56: Identifying Swivel Bearing And Output Shaft Courtesy of BMW OF NORTH AMERICA, INC.

Disengage brake hose from holder.



Fig. 57: Identifying Brake Hose Courtesy of BMW OF NORTH AMERICA, INC.

Support swivel bearing.

Release nut (1) and remove screw (2).

Installation:

Replace self-locking nuts.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

IMPORTANT: Tightening to torque must be effected by means of the screw!

Disengage pulse generator (3) from holder.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Remove swivel bearing.

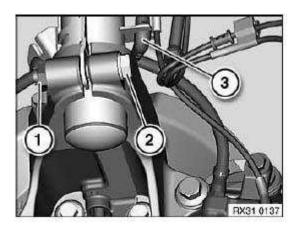


Fig. 58: Identifying Nut, Pulse Generator And Screw Courtesy of BMW OF NORTH AMERICA, INC.

The following components must be modified when the swivel bearing is replaced:

- Wheel bearing
- Brake console/brake guard plate
- Carry out electronic wheel alignment check

31 21 180 REPLACING BEARINGS (WHEEL HUB) FOR FRONT WHEEL

Remove wheel.

Release collar nut (1), press brake pedal to floor for this purpose.

Installation:

Replace collar nut.

Tightening torque. Refer to **FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK**.

IMPORTANT: Secure collar nut after tightening down on flattened area of drive shaft by peening.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

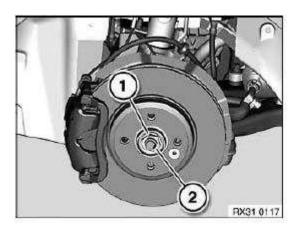


Fig. 59: Identifying Collar Nut Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

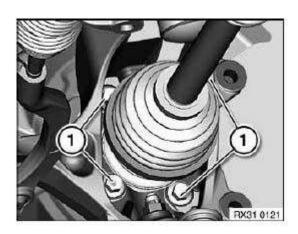
- Remove brake disc
- Remove front pulse generator

Release screws (1) and remove bearings for front wheel.

Installation:

Replace screws.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

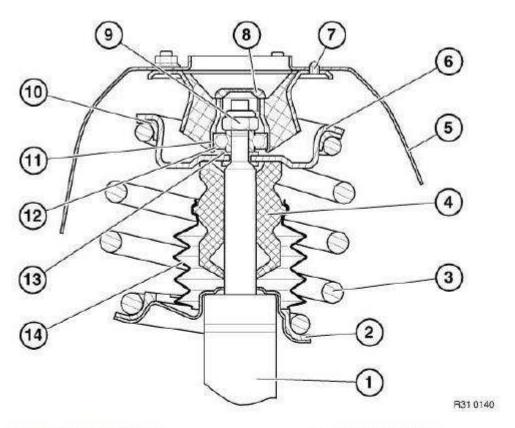


<u>Fig. 60: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

31 SPRING STRUT

31 LAYOUT OF SPRING STRUT SHOCK ABSORBER

2007 SUSPENSION Front Axle - Repair Instructions - Cooper



- 1 Spring strut shock absorber
- 2 Lower spring pad
- 3 Coil spring
- 4 Auxiliary spring
- 5 Wheel arch
- 6 Upper spring plate
- 7 Centering pin
- 8 Grease cap
- 9 Nut

- 10 Upper spring pad
- 11 Thrust bearing
- 12 Dust sleeve
- 13 Thrust washer/shim
- 14 Rubber gaiter

Fig. 61: Layout Of Spring Strut Shock Absorber Courtesy of BMW OF NORTH AMERICA, INC.

31 00 ... INFORMATION ON REPLACING SHOCK ABSORBERS

Facts:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Consequence:

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This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

31 31 000 REMOVING AND INSTALLING FRONT LEFT OR RIGHT SPRING STRUT

Special tools required:

- 31 2 310
- 31 5 220
- 32 3 090

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down.

Necessary preliminary tasks:

- Remove wheel
- If necessary, remove ride-height sensor from control arm

After completing work:

o If a spring strut with support bearing without centering pin is installed, it is necessary to carry out chassis/wheel alignment.

IMPORTANT: If the centering pin is missing from the support bearing, the position of the studs to the wheel arch must be marked so that the original camber is approximately maintained.

Only one nut may ever be released for marking.

Release nut on support joint on left or right.

Installation:

Replace self-locking nuts

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Press support joint with special tool 31 2 310 out of swivel bearing.

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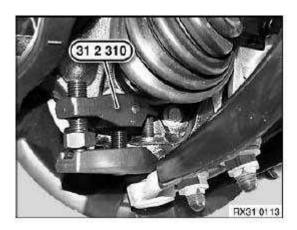


Fig. 62: Identifying Special Tool (31 2 310)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on tie rod end on left or right.

Installation:

Replace self-locking nuts

Tightening torque. Refer to <u>STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES - 2007 HATCHBACK</u>.

Press tie rod end out of swivel bearing with special tool 32 3 090.

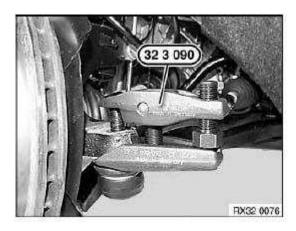


Fig. 63: Identifying Special Tool (32 3 090)
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

If necessary, grip at dihedron or at hexagon socket.

Installation:

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Replace self-locking nuts

Tightening torque. Refer to FRONT AXLE - TIGHTENING TOROUES - 2007 HATCHBACK.

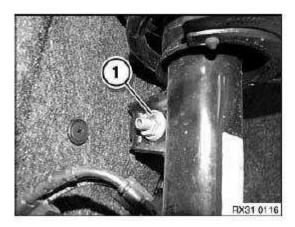


Fig. 64: Identifying Nut Courtesy of BMW OF NORTH AMERICA, INC.

Disengage brake hose from holder.

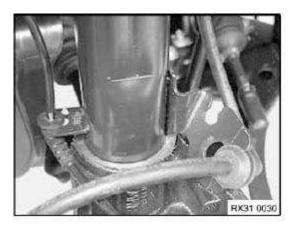


Fig. 65: Identifying Brake Hose Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!

Failure to comply with the following instructions may result in the car slipping off the lifting platform and causing serious injury.

When supporting components, it is essential to observe the following rules:

- Do not raise or lower the car further
- o Prevent the possibility of the lifting platform being activated
- The car must not under any circumstances lift off the locating plates on the lifting platform

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Secure special tool 31 5 220 to swivel bearing with two wheel bolts (1).

Insert workshop jack in special tool 31 5 220 and support swivel bearing.

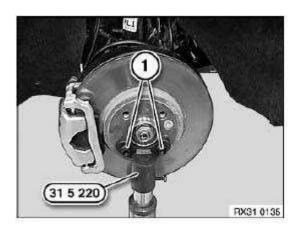


Fig. 66: Identifying Special Tool (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Replace self-locking nuts.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

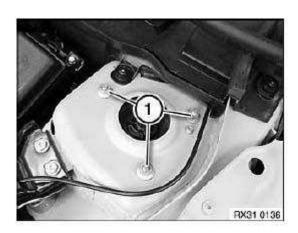


Fig. 67: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw (2).

Installation:

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Replace self-locking nuts.

Tightening torque. Refer to **FRONT AXLE - TIGHTENING TOROUES - 2007 HATCHBACK**.

IMPORTANT: Tightening to torque must be effected by means of the screw!

Disengage pulse generator (3) from holder.

Carefully lower workshop jack until spring strut can be removed.

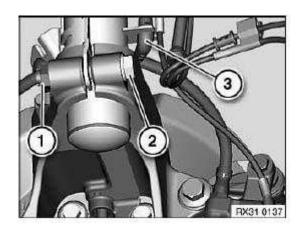


Fig. 68: Identifying Nut, Pulse Generator And Screw Courtesy of BMW OF NORTH AMERICA, INC.

31 31 031 REPLACING FRONT SPRING STRUT SHOCK ABSORBER ON RIGHT OR LEFT

Special tools required:

- 31 2 210
- 31 3 341
- 31 3 351

Necessary preliminary tasks:

• Remove complete front spring strut

NOTE: When a spring strut shock absorber is replaced, a spring strut shock absorber with the same identification marking must be installed.

WARNING: Every time before using, check that the special tools are fully operative.

Do not use special tools which are damaged.

No changes or modifications may be made to the special tools.

Use only suitable spring seats.

Special tool 31 3 341 is intended exclusively for tensioning and relieving

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BMW/MINI suspension springs.

Do not use an impact screwdriver for tensioning/relieving.

Keep protective pads free of oil and grease.

Disregard of the above requirements can considerably increase the risk of injury!

Clamp special tool 31 3 341 at guide (1) in vice.

Slide special tools 31 3 351 into each housing over taper of special tool 31 3 341.

Lock pins (2) must be heard and felt to lock in position.

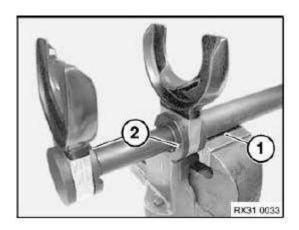


Fig. 69: Identifying Lock Pins And Guide Courtesy of BMW OF NORTH AMERICA, INC.

Spring retainers 31 3 351 must be fitted from the chamfered side of special tool 31 3 341 .

The lock pins must be heard and felt to lock in position.

Check fit of spring seats.

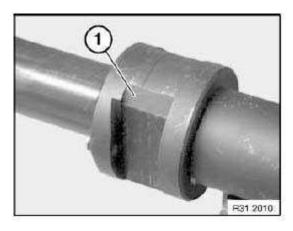


Fig. 70: Identifying Guide

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Courtesy of BMW OF NORTH AMERICA, INC.

Removal:

Insert spring strut in special tool 31 3 351 and align.

End of spring (1) must point upwards.

Tension coil spring until strain is removed from support bearing.

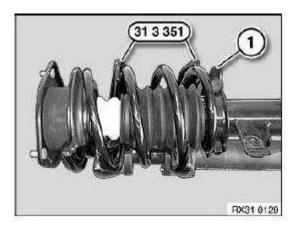


Fig. 71: Identifying Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The spring coil must lie completely in the recess when the spring is tensioned in the spring retainer.

Special tool 31 3 341 must not be tensioned or released with an impact wrench!

The coils may not be tensioned on a block.

Only tension the coil springs until stress on the support bearing is relieved.

The nut may only be released when the spring coil is resting completely in the recess of the spring holder! Repeat tensioning procedure if necessary.

Take off cap.

Release nut with special tool 31 2 210.

Grip piston rod with wrench.

Remove spring strut shock absorber.

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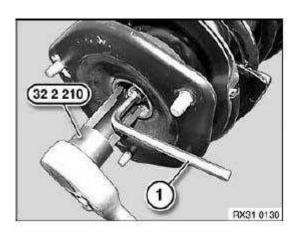


Fig. 72: Identifying Special Tool (31 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spring pad (1) for damage and replace if necessary.

Make sure rubber pimple (2) is seated correctly in bore on spring strut shock absorber.

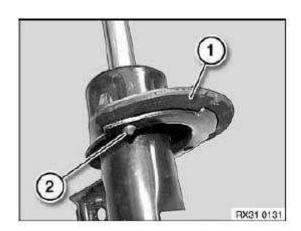
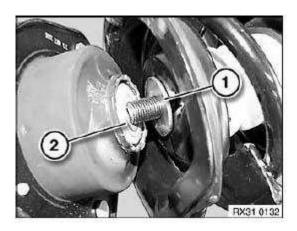


Fig. 73: Identifying Spring Pad And Rubber Pimple Courtesy of BMW OF NORTH AMERICA, INC.

Connect spring strut shock absorber, auxiliary spring, protective sleeve, coil spring and upper spring plate.

IMPORTANT: Make sure shim (1) and cover (2) are correctly mounted on upper spring plate or on support bearing.

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<u>Fig. 74: Identifying Shim And Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down nut with special tool 31 2 210 and torque wrench.

Grip piston rod with wrench (1).

Installation:

Replace self-locking nut.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Fit cover cap.

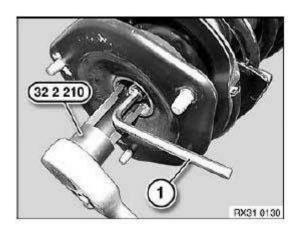
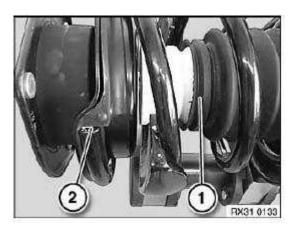


Fig. 75: Identifying Special Tool (31 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Make sure protective sleeve (1) is correctly connected to auxiliary spring.

End of upper coil spring must rest on indentation in upper spring plate and spring pad.

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<u>Fig. 76: Identifying Protective Sleeve</u> Courtesy of BMW OF NORTH AMERICA, INC.

End of lower coil spring (1) must rest on stop of spring pad (2).

Align all components correctly to each other and relive tension on coil spring.

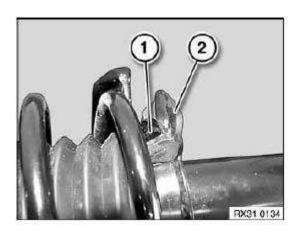


Fig. 77: Identifying Lower Coil Spring And Spring Pad Courtesy of BMW OF NORTH AMERICA, INC.

31 33 001 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SUPPORT BEARING

This operation is described in Replacing front **SPRING STRUT SHOCK ABSORBER**.

33 SPRING WITH SUSPENSION

31 33 001 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SUPPORT BEARING

This operation is described in Replacing front **SPRING STRUT SHOCK ABSORBER**.

31 33 095 MEASURING RIDE-LEVEL HEIGHT OF VEHICLE

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Necessary preliminary tasks:

• Move vehicle into normal position

Determine actual ride level (A).

Attach tape measure to rim flange at bottom middle and measure to wheel arch trim.

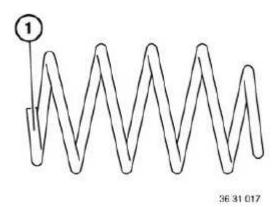


Fig. 78: Identifying Rim Flange Dimension Courtesy of BMW OF NORTH AMERICA, INC.

31 33 100 REMOVING AND INSTALLING/REPLACING COIL SPRING FOR LEFT OR RIGHT FRONT SPRING STRUT

This operation is described in Replacing **SPRING STRUT SHOCK ABSORBER**.

The coil springs suitable for the respective car must be assigned and ordered through the Electronic Spare Parts Catalogue (EPC) under the item Spring table.



<u>Fig. 79: Identifying Coil Springs</u> Courtesy of BMW OF NORTH AMERICA, INC.

35 STABILIZER BAR

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

31 35 000 REMOVING AND INSTALLING/REPLACING FRONT STABILIZER

Necessary preliminary tasks:

• Lower front axle support

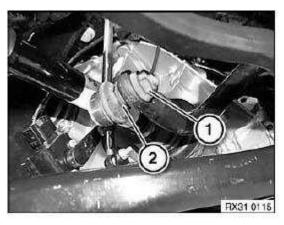
Unscrew nut (1).

If necessary, grip at dihedron (2) or at hexagon socket.

Installation:

Replace self-locking nut.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.



<u>Fig. 80: Identifying Nut And Dihedron</u> Courtesy of BMW OF NORTH AMERICA, INC.

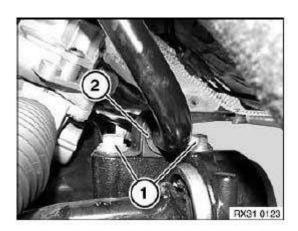
Release bolts (1) on left and right and remove stabilizer.

Installation:

Tightening torque. Refer to **FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK**.

Replace rubber mount for stabilizer (2).

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<u>Fig. 81: Identifying Rubber Mount For Stabilizer And Bolts</u> Courtesy of BMW OF NORTH AMERICA, INC.

31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER

Necessary preliminary tasks:

• Remove wheel

Unscrew nut (1).

If necessary, grip at dihedron (2) or at hexagon socket.

Installation:

Replace self-locking nut.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

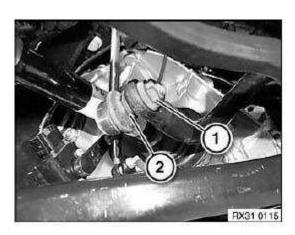


Fig. 82: Identifying Nut And Dihedron Courtesy of BMW OF NORTH AMERICA, INC.

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Unscrew nut (1).

If necessary, grip at dihedron or at hexagon socket.

Installation:

Replace self-locking nut.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

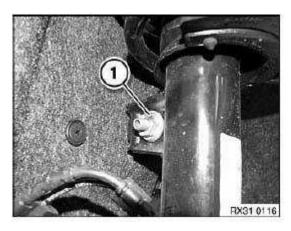


Fig. 83: Identifying Nut Courtesy of BMW OF NORTH AMERICA, INC.

31 35 021 REPLACING BOTH RUBBER MOUNTS FOR STABILIZER MOUNTING ON FRONT AXLE SUPPORT

Necessary preliminary tasks:

• Remove stabilizer

Remove retaining bar.

Remove rubber mount (1) from stabilizer (2).

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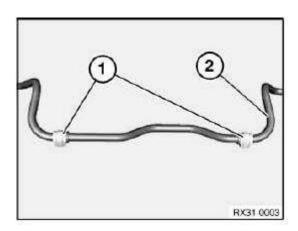


Fig. 84: Identifying Rubber Mount And Stabilizer Courtesy of BMW OF NORTH AMERICA, INC.

60 OUTPUT SHAFT

31 60 ... NOTES ON REMOVING AND INSTALLING LOW PROFILE BAND CLAMPS

Special tools required:

• 31 5 200

IMPORTANT: During removal Low Profile band clamp (dotted line) is overstretched and must not be reused!



<u>Fig. 85: Identifying Low Profile Band Clamp</u> Courtesy of BMW OF NORTH AMERICA, INC.

Removing:

Place special tool 31 5 200 on lugs (1, 2).

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NOTE: Make sure that the movable piece (3) of the special tool is placed on lug (1).

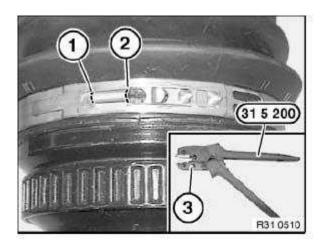


Fig. 86: Identifying Special Tool (31 5 200) Courtesy of BMW OF NORTH AMERICA, INC.

Compress Low Profile band clamp with special tool 31 5 200 until end of band clamp (1) lifts up.

Relieve tension on special tool and remove Low Profile band clamp.

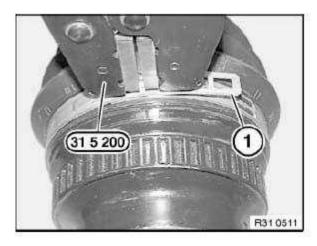


Fig. 87: Identifying Special Tool (31 5 200) Courtesy of BMW OF NORTH AMERICA, INC.

Assembly:

Position Low Profile band clamp in installation position (A) on gaiter.

Place special tool 31 5 200 on lugs (1, 2).

NOTE: Make sure that the movable piece (3) of the special tool is placed on lug (1).

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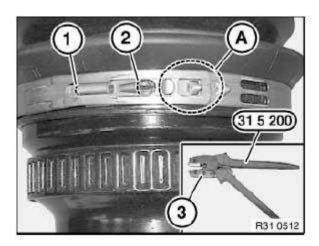


Fig. 88: Identifying Special Tool (31 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Check and if necessary correct positions of gaiter and Low Profile band clamp.

Compress Low Profile band clamp with special tool 31 5 200 and press on end of band clamp (1).

Relieve tension on special tool and remove.

Check hook fastener (H); if necessary, repeat operation with new Low Profile band clamp.

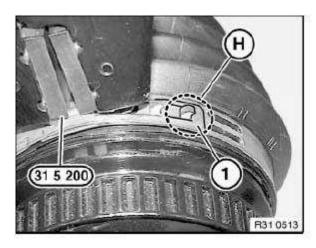


Fig. 89: Identifying Special Tool (31 5 200) Courtesy of BMW OF NORTH AMERICA, INC.

31 60 003 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT

Special tools required:

- 31 2 310
- 32 3 090

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Necessary preliminary tasks:

- Remove front wheel
- Manual transmissions only: Drain gearbox oil

After completing work, add gearbox oil and check for leaks.

Release collar nut (1), press brake pedal to floor for this purpose.

Installation:

Replace collar nut.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Secure collar nut (1) by peening at flat areas (2) of output shaft.

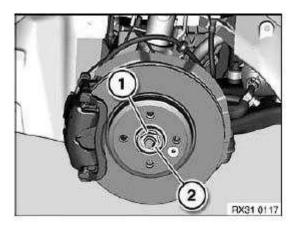


Fig. 90: Identifying Collar Nut Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on tie rod end on left and right.

Press tie rod end out of swivel bearing with special tool 32 3 090.

Installation:

Replace self-locking nuts.

Tightening torque. Refer to <u>STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES - 2007</u> HATCHBACK.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

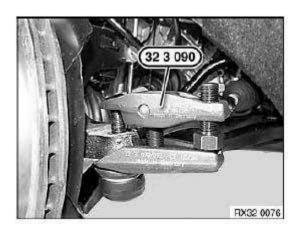


Fig. 91: Identifying Special Tool (32 3 090)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on support joint on left and right.

Press support joint with special tool 31 2 310 out of swivel bearing.

Installation:

Replace self-locking nuts.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

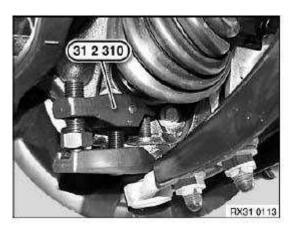
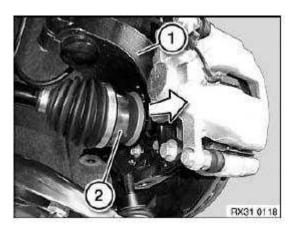


Fig. 92: Identifying Special Tool (31 2 310) Courtesy of BMW OF NORTH AMERICA, INC.

Press swivel bearing (1) outwards and feed output shaft (2) out of wheel hub spline teeth.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper



<u>Fig. 93: Identifying Swivel Bearing And Output Shaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pull inner output shaft joint out of gearbox and remove output shaft (1).

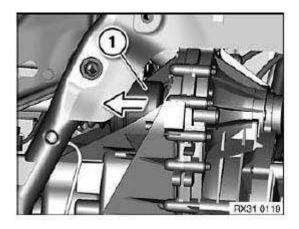


Fig. 94: Identifying Output Shaft Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The shaft seal must be replaced in the gearbox each time the output shaft is removed!

Installation:

Replace circlip.

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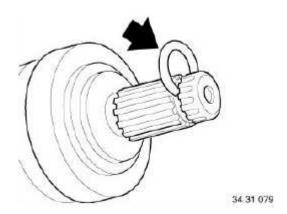


Fig. 95: Locating Circlip Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert assembly guard (1) into shaft seal.

Assembly guard (1) is provided with new shaft seal for output shaft.

Make sure the tool fits over the shaft seal lip so that the sealing ring is not damaged when the output shaft is inserted.

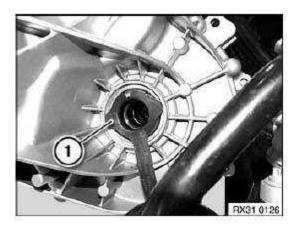


Fig. 96: Identifying Guard Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert output shaft (1) into gearbox.

Before sealing face is pushed into shaft seal, remove assembly guard (2) by pulling on handle.

Slide output shaft into gearbox up to stop.

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Output shaft coupling must snap audibly into place.

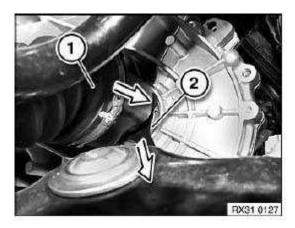


Fig. 97: Identifying Output Shaft And Guard Courtesy of BMW OF NORTH AMERICA, INC.

31 60 004 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT

Special tools required:

- 31 2 310
- 32 3 090

Necessary preliminary tasks:

- Remove front wheel
- Manual transmissions only: Drain gearbox oil

After completing work, add gearbox oil and check for leaks.

Release collar nut (1), press brake pedal to floor for this purpose.

Installation:

Replace collar nut.

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

Secure collar nut (1) by peening at flat areas (2) of output shaft.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

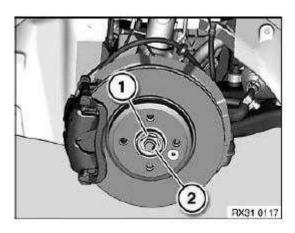


Fig. 98: Identifying Collar Nut Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on tie rod end on left and right.

Press tie rod end out of swivel bearing with special tool 32 3 090.

Installation:

Replace self-locking nuts.

Tightening torque. Refer to <u>STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES - 2007</u> HATCHBACK.

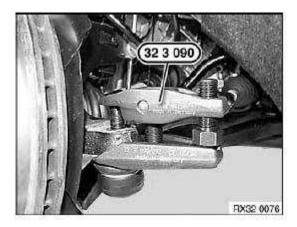


Fig. 99: Identifying Special Tool (32 3 090) Courtesy of BMW OF NORTH AMERICA, INC.

Release nut on support joint on left and right.

Press support joint with special tool 31 2 310 out of swivel bearing.

Installation:

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Replace self-locking nuts

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

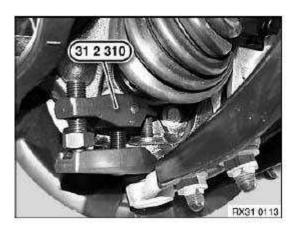


Fig. 100: Identifying Special Tool (31 2 310) Courtesy of BMW OF NORTH AMERICA, INC.

Press swivel bearing (1) outwards and feed output shaft (2) out of wheel hub spline teeth.

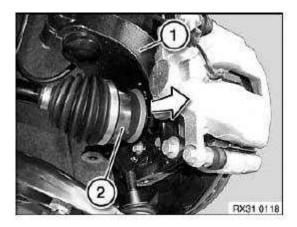


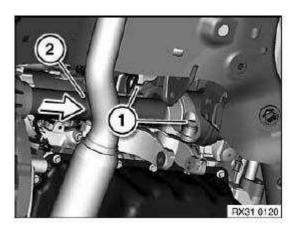
Fig. 101: Identifying Swivel Bearing And Output Shaft Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and pull output shaft (2) out of gearbox.

Installation:

Tightening torque. Refer to FRONT AXLE - TIGHTENING TORQUES - 2007 HATCHBACK.

2007 SUSPENSION Front Axle - Repair Instructions - Cooper



<u>Fig. 102: Identifying Screws And Output Shaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The shaft seal must be replaced in the gearbox each time the output shaft is removed!

Installation:

Insert assembly guard (1) into shaft seal.

Assembly guard (1) is provided with new shaft seal for output shaft.

Make sure the tool fits over the shaft seal lip so that the sealing ring is not damaged when the output shaft is inserted.

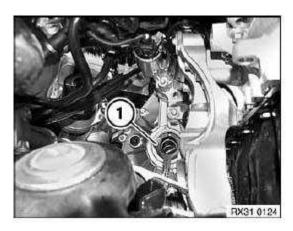


Fig. 103: Identifying Guard Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert output shaft (1) into gearbox.

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Before sealing face is pushed into shaft seal, remove assembly guard (2) by pulling on handle.

Slide output shaft into gearbox up to stop.

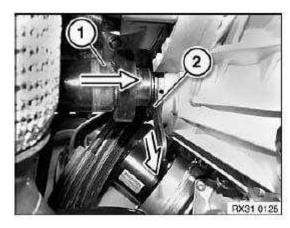


Fig. 104: Identifying Output Shaft And Guard Courtesy of BMW OF NORTH AMERICA, INC.

31 60 530 REPLACING AN OUTPUT SHAFT GAITER (ON TRANSMISSION SIDE) (OUTPUT SHAFT REMOVED)

NOTE: Procedure is described in <u>31 60 535 REPLACING BOTH GAITERS ON LEFT AND</u> RIGHT OF OUTPUT SHAFT (OUTPUT SHAFT REMOVED).

31 60 535 REPLACING BOTH GAITERS ON LEFT AND RIGHT OF OUTPUT SHAFT (OUTPUT SHAFT REMOVED)

Special tools required:

- 00 7 500
- 31 5 200
- 32 1 260

IMPORTANT: Do not press off or disassemble wheel-side joint.

The transmission-side joint may be bent by max. 18° and the wheel-side joint by max. 45°!

All traces off old grease must be removed!

Cleaning may only be carried out with dry, clean and grease-and fluff-free cloths!

Visible fouling on joints (e.g. by water or dirt) will cause premature failure!

IMPORTANT: Always use plastic protective jaws when working with a vice.

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Clean output shaft and grip in vice.

Release clamping bands (1).

Detach housing (2) and clean carefully.

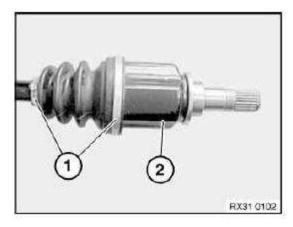
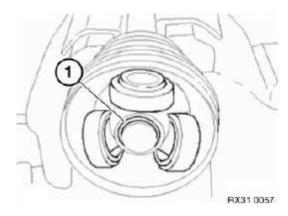


Fig. 105: Identifying Clamping Bands And Housing Courtesy of BMW OF NORTH AMERICA, INC.

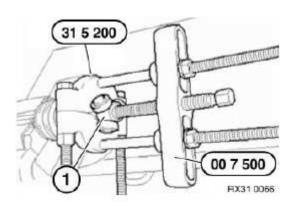
Remove snap ring (1).



<u>Fig. 106: Identifying Snap Ring</u> Courtesy of BMW OF NORTH AMERICA, INC.

Detach tripod star (1) with special tools 00 7 500 and 31 5 200 from output shaft and clean carefully.

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<u>Fig. 107: Identifying Special Tool (00 7 500) And (31 5 200)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Detach gaiter (1) of transmission-side joint and clean output shaft carefully.

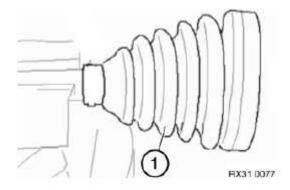


Fig. 108: Identifying Gaiter Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark axial position (1) of gaiter (2) to wheel-side joint (4).

Release clamping bands (3).

Detach gaiter (2) of wheel-side joint.

Clean joint (4) carefully.

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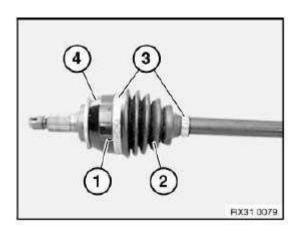


Fig. 109: Identifying Clamping Bands, Gaiter And Joint Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grease filling in wheel-side joint must not exceed 65g!

During assembly, the sealing faces on the gaiter and joint must be clean, dry and free of grease!

Slide new gaiter (2) onto output shaft and fill with lubricating grease.

Slide filled gaiter onto wheel-side joint and align by way of axial markings (1).

NOTE: Make sure gaiter is correctly seated in groove of wheel-side joint.

Mount new clamping band (3) with special tool 32 1 260.

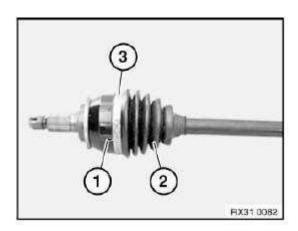


Fig. 110: Identifying Clamping Bands, Gaiter And Joint Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Gaiter must be vented after fitting in order to adapt the overpressure generated during fitting to the ambient pressure!

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Vent gaiter (1); slide a suitable tool between gaiter and output shaft for this purpose.

NOTE: Make sure gaiter is correctly seated in groove of output shaft.

Mount new clamping band (2) with special tool 32 1 260.

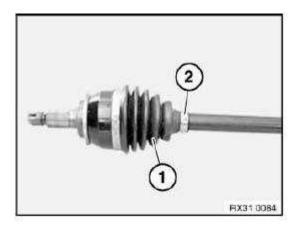
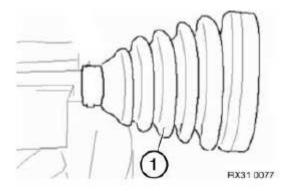


Fig. 111: Identifying Clamping Band And Gaiter Courtesy of BMW OF NORTH AMERICA, INC.

Slide new gaiter (1) with new clamping bands onto output shaft.



<u>Fig. 112: Identifying Gaiter</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Align tripod star so that chamfer (arrow) points to output shaft.

Drive tripod star with a suitable tool (1) onto output shaft until groove for snap ring is exposed.

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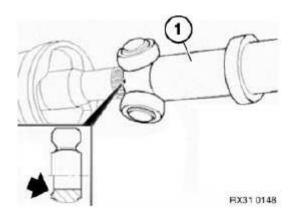


Fig. 113: Identifying Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Install new snap ring (1).

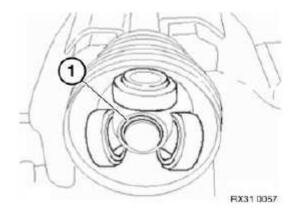


Fig. 114: Identifying Snap Ring Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grease filling in wheel-side joint must not exceed 100g!

Pack lubricating grease into housing (1).

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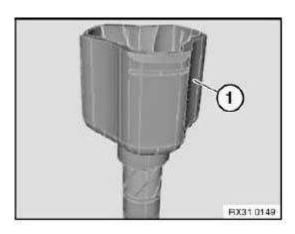


Fig. 115: Identifying Housing Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: During assembly, the sealing faces on the gaiter and joint must be clean, dry and free of grease!

Attach packed housing (1) to tripod star and into gaiter (2).

NOTE: Make sure gaiter is correctly seated in groove of housing.

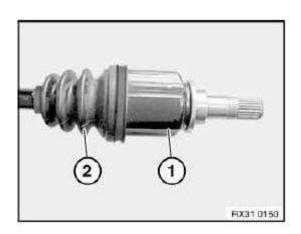
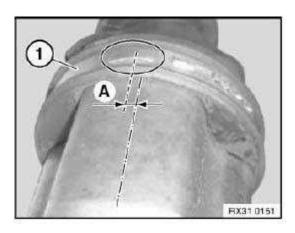


Fig. 116: Identifying Housing And Gaiter Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Centerpoint of clamping pipe must be situated at height of housing centerline! Max. deviation (A) \pm 10 mm

Align and fit new Low Profile band clamp (1).

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<u>Fig. 117: Identifying Low Profile Band Clamp</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Gaiter must be vented after fitting in order to adapt the overpressure generated during fitting to the ambient pressure!

Adjust gaiter length to 91.5 mm.

Vent gaiter (1); slide a suitable tool between gaiter and output shaft for this purpose.

Mount new clamping band (2) with special tool 32 1 260.

NOTE: Ensure correct gaiter length.

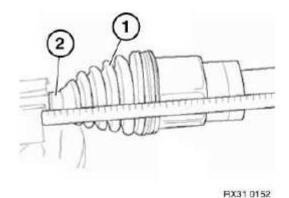


Fig. 118: Identifying Clamping Band And Gaiter Courtesy of BMW OF NORTH AMERICA, INC.

90 TROUBLESHOOTING

31 90 ... TROUBLESHOOTING SHOCK ABSORBER

TROUBLESHOOTING SHOCK ABSORBER

2007 SUSPENSION Front Axle - Repair Instructions - Cooper

Fault	Cause	Remedy	
Wheel knocking (bottoming)	Auxiliary damper faulty Visually inspect auxiliary sprin cracking; if necessary, replace spring.		
	Shock absorber leaking (oil/gas)	Replace shock absorber	
	Shock absorber mounting loose	Tighten shock absorber	
Rattling noise	Support bearing faulty/hardened	Replace support bearing	
	Shock absorber leaking (oil/gas)	Replace shock absorber	
Worn down areas (flattened areas) on tyre profile	Shock absorber leaking (oil/gas)	Replace shock absorber	
Long after-swinging of body after driving over rough road	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber	
Building-up of body in case of successive uneven surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber	
Wheels jumping even on normal road surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber	
Whistling noises	Separating skin in vent holes of auxiliary spring	Remove separating skin	

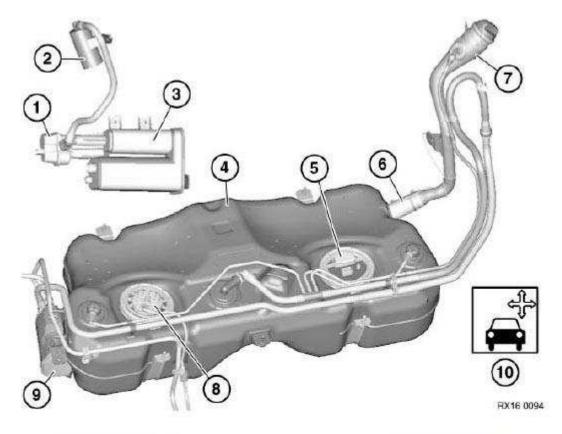
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2007 ENGINE

Fuel Supply System - Repair Instructions - Cooper S

00 FUEL PICK-UP, CLEANING

16 00 ... OVERVIEW OF FUEL SUPPLY SYSTEM (PETROL/GASOLINE)



1	Leak diagnosis pump	2	Dust filter with tube
3	Carbon canister for DMTL (USA)	4	Fuel tank
5	Delivery unit, left	6	Rubber sleeve
7	Fuel filler pipe	8	Carbon canister
9	Fuel filter with fuel level sensor, right	10	Draw off fuel

Fig. 1: Fuel Supply System Components And Assembly Courtesy of BMW OF NORTH AMERICA, INC.

16 00 005 DRAINING AND FILLING FUEL TANK

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

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Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT:

- Make sure the work bay is adequately ventilated.
- Connect an exhaust extractor system to exhaust tailpipe.
- Carefully withdraw extraction hose so as not to damage non-return flap.
- The electric fuel pump must not operate without fuel!
- On conclusion of repair work and before starting the engine for the first time, the fuel tank must be filled via the fuel filler pipe with at least 5 litres of fuel.

NOTE: Vehicles with diesel engines:

Before starting the engine for the first time, if the tank has been run dry or drawn off, fill with diesel fuel and turn on ignition for approx. 1 minute. The fuel circuit is thus filled and vented, which results in the engine firing more quickly.

Drawing off fuel:

Start engine and allow to run. The electric fuel pump runs.

The pump delivers fuel via the suction jet pump and the tank expansion line from the left to the right side of the fuel tank.

Fuel can be drawn off from the left and right tank halves through the fuel filler pipe down to a small residual amount. This residual amount is drawn off after removal of the sensors for the fuel gauge (right/left).

Feed suction hose (1) of extractor unit into filler pipe. In so doing, turn hose slightly if necessary.

Insertion length:

90 cm

Draw off fuel with suction extractor unit as far as possible.

Observe the fuel gauge in the instrument cluster while extracting fuel.

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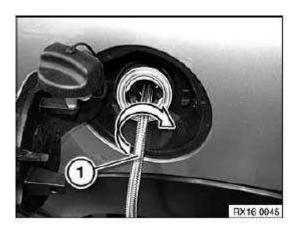


Fig. 2: Suction Hose And Installation Direction Courtesy of BMW OF NORTH AMERICA, INC.

Drawing off residual fuel quantity:

IMPORTANT: Make sure vehicle interior is adequately ventilated.

Catch dripping fuel in a suitable container.

Remove fuel filter with fuel level sensor (right) (50-litre tank only).

Remove delivery unit (left).

Draw off residual fuel quantity through installation openings.

Fuel filling:

Slide suction hose of extractor unit approx. 40 cm into fuel filler pipe.

Fill fuel from suction extractor unit.

16 00 100 CHECKING FUEL TANK AND TANK VENTING SYSTEM FOR LEAKS (NOT US VERSION WITH DMTL)

Special tools required:

- 13 3 010
- 16 1 070
- 16 1 171
- 16 1 174

NOTE: The following procedure is only applicable to vehicles without the tank leak diagnosis module.

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Check tank venting system if a leak is suspected.

Necessary preliminary tasks:

• Remove rear right Wheel Arch Trim .

Comply with the following conditions in order to obtain plausible test results:

- o Content of fuel tank:
 - 1 Maximum 90 %
 - 2. Minimum 13 % (reserve telltale must not light up).
- o Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10 ... 20°C).
- o Never refuel the vehicle directly prior to the leak test due to the strong emission of gas by the fresh fuel.

Using special tool 16 1 070, seal opening (1) on carbon canister.

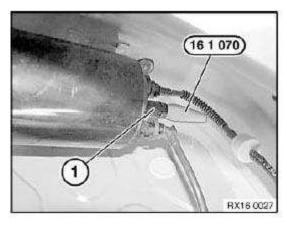
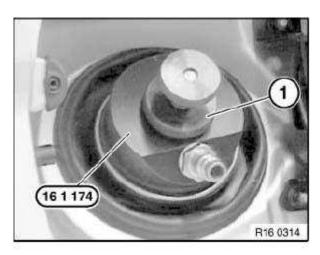


Fig. 3: Seal Opening And Special Tool (16 1 070) Courtesy of BMW OF NORTH AMERICA, INC.

Remove fuel filler cap and connect special tool 16 1 174 to fuel filler neck.

Clamp special tool 16 1 174 on fuel filler neck with adjusting wheel (1).

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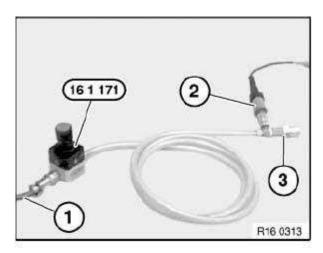
<u>Fig. 4: Wheel And Special Tool (16 1 174)</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set pressure regulator on special tool 16 1 171 fully in "-" direction.

Connect special tool 16 1 171 using compressed air line (1) to garage compressed air system (8 ... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0...3.5 bar.

IMPORTANT: Do not yet connect fast-release coupling (3) of special tool 16 1 171.



<u>Fig. 5: Air Line, Pressure Sensor, Quick-Release Coupling And Special Tool (16 1 171)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Select "Measurement" function on Diagnosis and Information System (DIS).

Using pressure regulator on special tool 16 1 171, increase pressure by 0.050 bar.

Connect special tool 16 1 174 to fast-release coupling of special tool 16 1 171 .

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Using pressure regulator on special tool 16 1 171, reset gauge pressure in fuel tank to 0.050 bar.

IMPORTANT: Do not under any circumstances increase pressure by more than 0.05 bar as this would result in damage to the fuel tank and venting system.

Using special tool 13 3 010, disconnect delivery line from special tool 16 1 171 to fuel filler neck.

Allow a rest period of approx. 20 secs.

Read off and note down starting pressure value.

Wait approx. 60 secs.

Read off final pressure value and compare with starting pressure value.

Measurement evaluation:

LEAK TEST REFERENCE

Pressure drop between 0.008 and 0.010 bar.	Measure again.
	System leaking beyond permitted levels. Carry out leak test.

16 00 100 CHECKING FUEL TANK AND TANK VENTING SYSTEM FOR LEAKS (PETROL/GASOLINE CARS WITH LEAK DIAGNOSIS PUMP / US VERSION)

Special tools required:

- 13 3 010
- 16 1 161
- 16 1 171
- 16 1 174

Necessary preliminary tasks:

• Remove rear right Wheel Arch Trim.

The following procedure is only applicable to cars with the leak diagnosis pump (US version).

Comply with the following conditions in order to obtain plausible test results:

- o Content of fuel tank:
 - 1. Maximum 90 %
 - 2. Minimum 13 % (reserve telltale must not light up).
- o Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10 ... 20°C).

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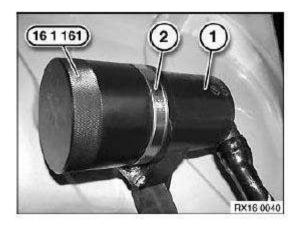
o Never refuel the vehicle directly prior to the leak test due to the strong emission of gas by the fresh fuel.

Clean housing of dust filter (1).

Slide special tool 16 1 161 over vent openings of dust filter.

IMPORTANT: Slide special tool 16 1 161 on dust filter (1) until openings are sealed.

Tighten down hose clip (2).



<u>Fig. 6: Hose Clip, Housing Of Dust Filter And Special Tool (16 1 161)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove fuel filler cap and connect special tool 16 1 174 to fuel filler neck.

Clamp special tool 16 1 174 on fuel filler neck with adjusting wheel (1).

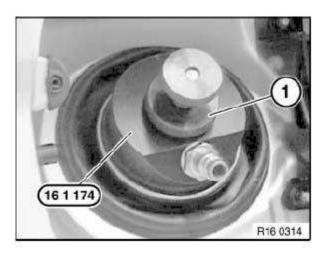


Fig. 7: Wheel And Special Tool (16 1 174) Courtesy of BMW OF NORTH AMERICA, INC.

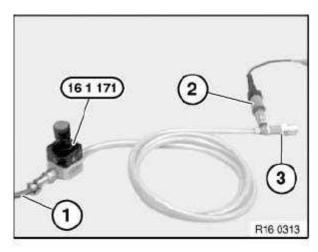
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IMPORTANT: Turn pressure regulator on special tool 16 1 171 counterclockwise up to stop.

Connect special tool 16 1 171 using compressed air line (1) to garage compressed air system (8 ... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0 ... 25 bar.

IMPORTANT: Do not yet connect fast-release coupling (3) of special tool 16 1 171.



<u>Fig. 8: Air Line, Quick-Release Coupling, Pressure Sensor And Special Tool (16 1 171)</u> Courtesy of BMW OF NORTH AMERICA, INC.

- 1. Select "Measurement" function on Diagnosis and Information System (DIS).
- 2. Using pressure regulator on special tool 16 1 171, increase pressure by 0.20 bar.
- 3. Connect special tool 16 1 174 to fast-release coupling of special tool 16 1 171.
- 4. Wait until the value at the Diagnosis and Information System has levelled out.
- 5. Using pressure regulator on special tool 16 1 171, reset gauge pressure in fuel tank to 0.20 bar.

IMPORTANT: Do not under any circumstances increase pressure by more than 0.30 bar as this would result in damage to the fuel tank and venting system.

Using special tool 13 3 010, disconnect delivery line from special tool 16 1 171 to fuel filler neck.

Allow a rest period of approx. 20 sec.

Read off and note down starting pressure value.

Wait approx. 120 sec.

Read off final pressure value and compare with starting pressure value.

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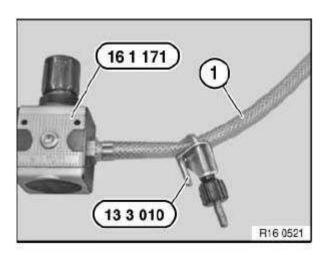


Fig. 9: Fuel Filler Neck Delivery Line, Special Tools (16 1 171) And (13 3 010) Courtesy of BMW OF NORTH AMERICA, INC.

Measurement evaluation:

o Pressure drop up to 0.01 bar:

System OK

o Pressure drop over 0.02 bar:

System leaking beyond permitted levels

If the system is leaking, a **Leak Test** must be carried out and the defective components replaced.

16 00 510 CONDUCTING LEAK TEST ON FUEL TANK AND TANK VENTING SYSTEM

Necessary preliminary tasks:

• Pressurize Fuel Tank And Tank Venting System

NOTE: During the leak test with a leak detector, be sure to follow the operating instructions of the equipment manufacturer.

IMPORTANT: Escaping fuel vapours; only work in well-ventilated rooms or use suitable exhaust extraction unit.

Observe country-specific accident prevention and occupational safety regulations.

The leak test can be carried out with a leak detector.

Possible causes may be:

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- o Fuel filler cap leaking
- o Tank venting lines leaking (fuel tank; carbon canister; tank venting valve)
- o Tank ventilation valve leaky (engine compartment)
- o Tank sensor on fuel tank leaky



R16 0131

<u>Fig. 10: Leak Detector</u> Courtesy of BMW OF NORTH AMERICA, INC.

11 FUEL TANK WITH MOUNTING

16 11 ... REPLACING LEFT OR RIGHT CLAMPING BAND

Necessary preliminary tasks:

• Remove rear left or right **Underbody Panelling**

IMPORTANT: Secure fuel tank against slipping and falling out.

Heavily support the fuel tank.

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Fig. 11: Support Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Release expansion rivet (1).

Release screws (2) and remove clamping band.

Installation:

For tightening torque refer to 16 11 5AZ in $\underline{\textbf{16 11 FUEL TANK AND FASTENING ELEMENTS}}$.

RX16 00-95

000 00 000

<u>Fig. 12: Expansion Rivet And Camping Band Mounting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

16 11 030 REMOVING AND INSTALLING FUEL TANK (50-LITRE TANK)

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Avoid skin contact (wear gloves)!

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Ensure adequate ventilation in the place of work!

After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub
- Measured value: approx. 0.65 ohms
- Fill fuel tank with at least 5 litres of fuel

Necessary preliminary tasks:

- Draw off Fuel From Fuel Tank
- Remove rear left and right Wheel Arch Trim.
- Remove underbody panelling on left and right
- Remove **Exhaust System**
- Remove heat shield

Detach locking clip (1) in direction of arrow.

Disengage parking brake Bowden cable (2) from actuating lever (3) at brake caliper.

Feed out parking brake Bowden cable (2) downwards.

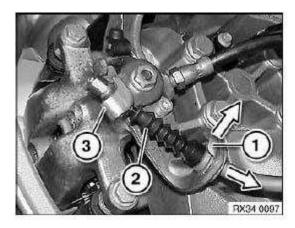


Fig. 13: Locking Clip, Bowden Cable, Actuating Lever And Removal Directions Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (2) from rear axle carrier.

Installation:

For tightening torque refer to 34 41 2AZ in 34 41 PARKING BRAKE

Disengage parking brake Bowden cables from holders (1) and feed out through rear axle carrier.

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NOTE: Parking brake Bowden cables remain suspended on handbrake lever.

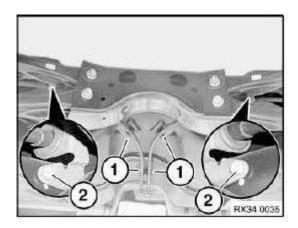


Fig. 14: Rear Axle Carrier, Parking Brake Bowden Cable Holders And Retaining Bolts Courtesy of BMW OF NORTH AMERICA, INC.

Unlock quick-release fasteners (1) on carbon canister and detach.

Installation:

Make sure quick-release fasteners engage correctly.



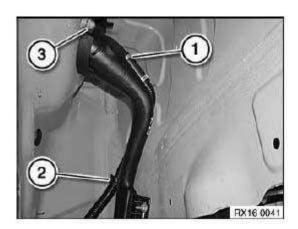
<u>Fig. 15: Carbon Canister Quick-Release Fasteners</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamp (1) and disengage filler vent line from holder (2).

Installation:

Replace hose clip.

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<u>Fig. 16: Hose Clamp And Filler Ventline Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamp (1) and detach filler hose from fuel tank.

Installation:

For tightening torque refer to 16 11 4AZ in 16 11 FUEL TANK AND FASTENING ELEMENTS.

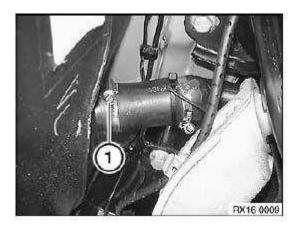


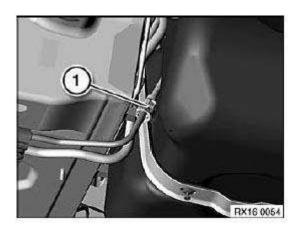
Fig. 17: Filler Hose Clamp Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect quick-release fastener (1) of fuel feed line.

Installation:

Make sure that quick-release fastener is correctly engaged.

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<u>Fig. 18: Fuel Feed Line Quick-Release Fastener</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure fuel tank over a wide area with a suitable workshop jack and secure against falling down.

Remove expander rivets (1).

Release screws (2) and lower fuel tank a little.

Installation:

For tightening torque refer to 16 11 3AZ in 16 11 FUEL TANK AND FASTENING ELEMENTS.

Disconnect plug connection on left sensor unit.

IMPORTANT: Vent lines on left must be guided carefully through openings in body.

Lower fuel tank.

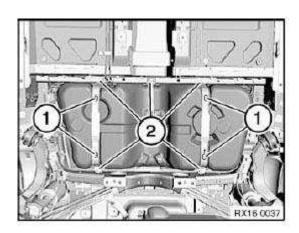


Fig. 19: Expander Rivets And Fuel Tank Mounting Screw Courtesy of BMW OF NORTH AMERICA, INC.

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Replacement:

- Modify left and right **fuel level sensors**
- Convert fuel feed line between delivery unit and cutting line

Unfasten hose clip (1) and remove hose.

Installation:

Replace hose clip.

Disconnect quick-release fasteners (2), detach vent lines (3) from bracket and modify.

Installation:

Make sure lines and wiring harness are not trapped or crushed during installation.

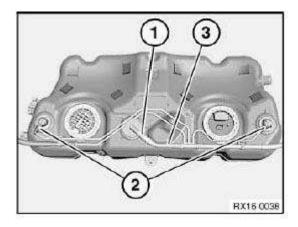


Fig. 20: Quick-Release Fasteners, Vent Lines And Hose Clamp Courtesy of BMW OF NORTH AMERICA, INC.

16 11 060 REMOVING AND INSTALLING/REPLACING FUEL FILLER PIPE

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

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After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub.
- Measured value: approx. 0.65 ohms.
- Fuel tank must be filled with at least 5 litres of fuel.

Necessary preliminary tasks:

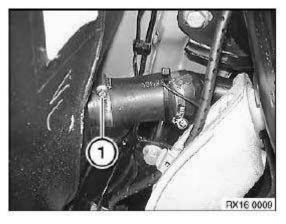
- Draw off fuel from fuel tank
- Remove rear left Wheel Arch Trim.
- Remove left Underbody Panelling
- Unscrew fuel filler cap from fuel filler pipe

Unfasten hose clip (1).

Detach fuel hose from fuel tank

Installation:

For tightening torque refer to 16 11 4AZ in 16 11 FUEL TANK AND FASTENING ELEMENTS.



<u>Fig. 21: Fuel Hose Clamp</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Installation:

Replace hose clip.

Unclip vent line from holder (2).

Unscrew nut (3).

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Installation:

Replace nut.

For tightening torque refer to 16 11 1AZ in 16 11 FUEL TANK AND FASTENING ELEMENTS.

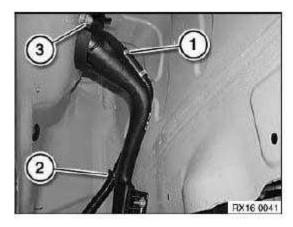


Fig. 22: Vent Line Holder, Hose Clip And Nut Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Installation:

For tightening torque refer to 16 11 1AZ in $\underline{\textbf{16 11 FUEL TANK AND FASTENING ELEMENTS}}$.

Wind grounding cable (2) back around fuel filler pipe.

Remove fuel filler pipe (3).

Installation:

Make sure grounding cable (2) is correctly fitted.

Following seals must be correctly fitted:

- o Vent hose to fuel filler pipe
- o Fuel filler pipe to body cutout

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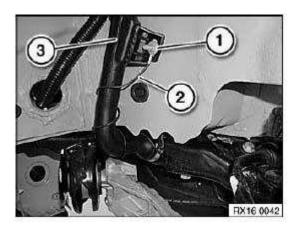


Fig. 23: Grounding Cable, Fuel Filler Pipe And Mounting Nut Courtesy of BMW OF NORTH AMERICA, INC.

16 11 071 REPLACING RUBBER SLEEVE BETWEEN FUEL FILLER PIPE AND FUEL TANK

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub.
- Measured value: approx. 0.65 ohms.
- Fuel tank must be filled with at least 5 litres of fuel.

Necessary preliminary tasks:

- Remove rear left Wheel Arch Trim .
- Remove left **Underbody Panelling**
- Draw off Fuel From Fuel Tank

Unscrew nut (1).

Installation:

For tightening torque refer to 16 11 1AZ in 16 11 FUEL TANK AND FASTENING ELEMENTS.

Make sure grounding cable (2) is correctly laid and secured.

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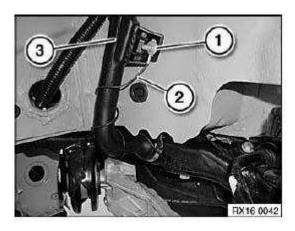


Fig. 24: Grounding Cable, Fuel Filler Pipe And Mounting Nut Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable tie (1).

Loosen hose clamps (2).

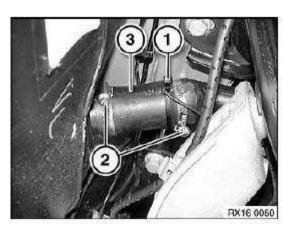
Detach rubber sleeve (3) first from fuel filler pipe and then from fuel tank.

Installation:

For tightening torque refer to 16 11 4AZ in 16 11 FUEL TANK AND FASTENING ELEMENTS.

Replace cable ties.

Make sure grounding cable is correctly fitted.



<u>Fig. 25: Rubber Sleeve, Hose Clamp And Cable Tie</u> Courtesy of BMW OF NORTH AMERICA, INC.

12 FUEL TRANSFER, SENSOR

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16 12 010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (50-LITRE TANK)

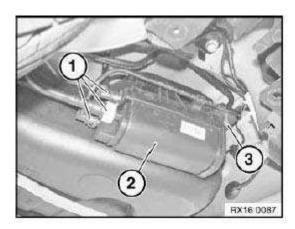
Necessary preliminary tasks:

• Remove rear right **Underbody Panelling**

Unlock and detach quick-connect couplings (1).

Unscrew bolt (3).

Withdraw carbon canister (2) from mounting and remove.



<u>Fig. 26: Quick-Connect Couplings, Carbon Canister And Bolt Courtesy of BMW OF NORTH AMERICA, INC.</u>

16 12 010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION WITH DMTL)

Necessary preliminary tasks:

• Remove rear right **Underbody Panelling**

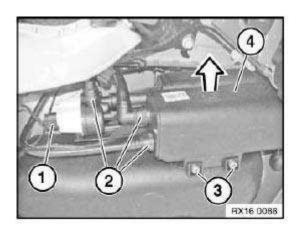
Disconnect plug connection (1).

Unlock and detach quick-connect couplings (2).

Release screws (3).

Press off carbon canister with tank leakage diagnosis module in direction of arrow.

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<u>Fig. 27: Plug Connection, Quick-Connect Couplings, Screws And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carbon canister must snap correctly into place in guide (1).

Replacement:

o Modify Tank Leakage Diagnosis Module

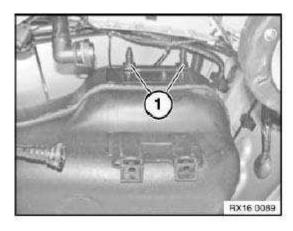


Fig. 28: Carbon Canister Guide Courtesy of BMW OF NORTH AMERICA, INC.

13 FUEL VENTILATION

16 13 015 REMOVING AND INSTALLING/REPLACING TANK LEAK DIAGNOSIS MODULE (PETROL/GASOLINE CARS WITH US DMTL VERSION)

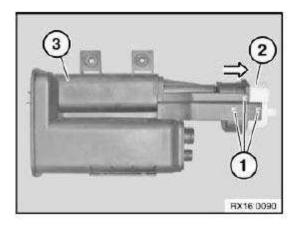
Necessary preliminary tasks:

• Remove Carbon Canister

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Release screws (1).

Detach tank leakage diagnosis module (2) in direction of arrow from carbon canister (3).



<u>Fig. 29: Retaining Screws, Leak Diagnosis Module, Carbon Canister And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

14 FUEL PUMP

16 14 015 REMOVING AND INSTALLING/REPLACING FUEL PUMP WITH FUEL LEVEL SENSOR (50-LITRE TANK)

Special tools required:

16 1 020

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

Fill fuel tank with at least 5 litres of fuel.

Necessary preliminary tasks:

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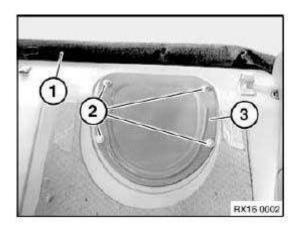
- Draw off Fuel From Fuel Tank
- Remove Rear Seat

Push trim panel (1) forward.

Unscrew nuts (2).

For tightening torque refer to 16 11 2AZ in 16 11 FUEL TANK AND FASTENING ELEMENTS.

Remove cover (3).



<u>Fig. 30: Cover, Trim Panel And Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection.

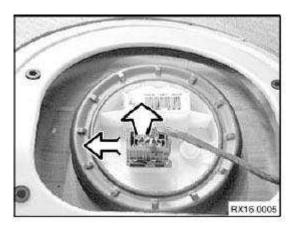


Fig. 31: Plug Connection And Removal Directions Courtesy of BMW OF NORTH AMERICA, INC.

Release screw cap with special tool 16 1 020.

Installation:

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For tightening torque refer to 16 14 1AZ in 16 14 FUEL PUMP.

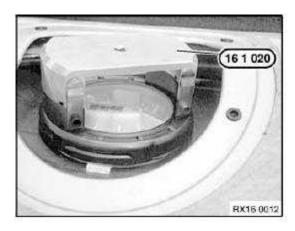


Fig. 32: Special Tool (16 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Raise unit.

NOTE: To improve installation, secure cable (1) and lines (2 and 3) with cord.

Disconnect plug connection (1).

Unlock line (2) at quick-release fastener and detach.

Unclip line (3).

Carefully lift fuel pump with fuel level sensor out of fuel tank.

Installation:

Replace rubber seal (4).

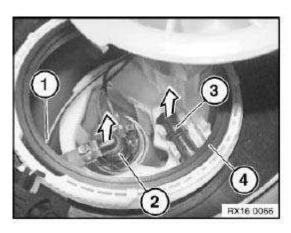


Fig. 33: Cable, Lines, Plug Connection And Removal Directions

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Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing fuel level sensor, make sure lug (1) engages in recess (2) on tank.

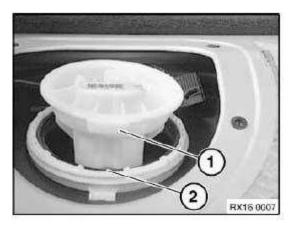


Fig. 34: Fuel Level Sensor Lug And Tank Recess Courtesy of BMW OF NORTH AMERICA, INC.

16 14 017 REMOVING AND INSTALLING/REPLACING FUEL FILTER WITH FUEL LEVEL SENSOR (50-LITRE TANK)

Special tools required:

• 16 1 020

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

Fill fuel tank with at least 5 litres of fuel.

Necessary preliminary tasks:

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- Draw off Fuel From Fuel Tank
- RemoveRear Seat
- Remove **Complete Sensor Unit (Left)**

Installation:

Secure a cable to hose pack through left service opening in tank.

The cable facilitates reinstallation of the hose pack.

Push trim panel (1) forward.

Release screws (2).

Installation:

For tightening torque refer to 16 11 2AZ in 16 11 FUEL TANK AND FASTENING ELEMENTS.

Remove cover (3).

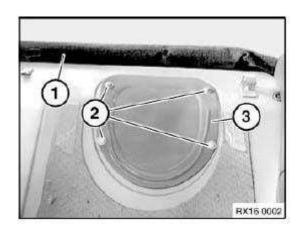
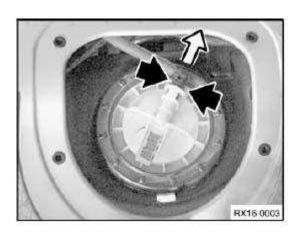


Fig. 35: Cover, Trim Panel And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock fuel line and detach.

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<u>Fig. 36: Fuel Line And Removal Direction</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw cap with special tool 16 1 020.

Installation:

Replace rubber seal.

For tightening torque refer to 16 14 1AZ in 16 14 FUEL PUMP.

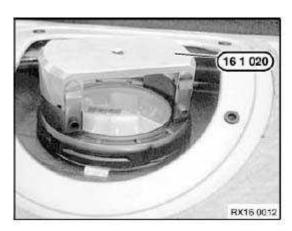


Fig. 37: Special Tool (16 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove line holder from sensor unit. Lift sensor unit and lines out of fuel tank.

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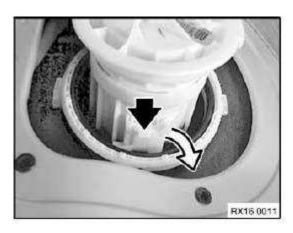
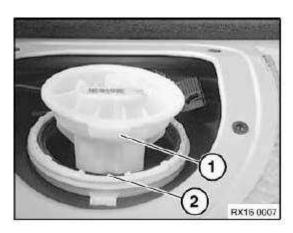


Fig. 38: Removing Line Holder From Sensor Unit Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing fuel filter, make sure lug (1) engages in recess (2) on tank.



<u>Fig. 39: Fuel Filler Lug And Tank Recess</u> Courtesy of BMW OF NORTH AMERICA, INC.

16 14 060 REMOVING AND INSTALLING/REPLACING DUST FILTER FOR TANK LEAKAGE DIAGNOSIS MODULE (DMTL)

Necessary preliminary tasks:

• Remove rear right Wheel Arch Trim.

Pull off hose (1).

Release nuts (2) and remove dust filter (3).

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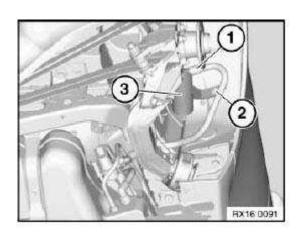


Fig. 40: Dust Filter, Hose And Nuts Courtesy of BMW OF NORTH AMERICA, INC.

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2007 ENGINE

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00 FUEL PICK-UP, CLEANING SYSTEM

16 00 005 DRAINING AND FILLING FUEL TANK

IMPORTANT:

- Observe country-specific safety regulations.
- Make sure the work bay is adequately ventilated.
- Connect an exhaust extractor system to exhaust tailpipe.
- Carefully withdraw extraction hose so as not to damage non-return flap.
- The electric fuel pump must not operate without fuel!
- On conclusion of repair work and before starting the engine for the first time, the fuel tank must be filled via the fuel filler pipe with at least 5 liters of fuel.

NOTE:

Vehicles with diesel engines:

Before starting the engine for the first time, if the tank has been run dry or drawn off, fill with diesel fuel and turn on ignition for approx. 1 minute. The fuel circuit is thus filled and vented, which results in the engine firing more quickly.

Drawing off fuel:

Start engine and allow to run. The electric fuel pump runs.

The pump delivers fuel via the suction jet pump and the tank expansion line from the left to the right side of the fuel tank.

Fuel can be drawn off from the left and right tank halves through the fuel filler pipe down to a small residual amount. This residual amount is drawn off after removal of the sensors for the fuel gauge (right/left).

Feed suction hose (1) of extractor unit into filler pipe. In so doing, turn hose slightly if necessary.

Insertion length:

90 cm

Draw off fuel with suction extractor unit as far as possible.

Observe the fuel gauge in the instrument cluster while extracting fuel.

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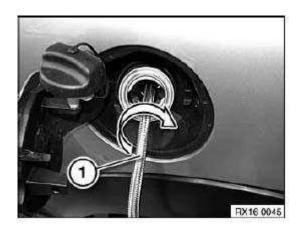


Fig. 1: Suction Hose Courtesy of BMW OF NORTH AMERICA, INC.

Drawing off residual fuel quantity:

IMPORTANT: Make sure vehicle interior is adequately ventilated.

Catch dripping fuel in a suitable container.

Remove fuel gauge sensor (right) (50-litre tank only).

Remove (left) fuel gauge sensor.

Draw off residual fuel quantity through installation openings.

Fuel filling:

Slide suction hose of extractor unit approx. 40 cm into fuel filler pipe.

Fill fuel from suction extractor unit.

NOTE: Drawing off after a fault on suction jet pump (50-litre tank only):

Completely empty left half of fuel tank via fuel filler pipe.

Remove (right) fuel gauge sensor.

Insert extractor hose through installation opening of sensor into the fuel tank.

The fuel (also residual quantities) can now be drawn off.

11 FUEL TANK WITH MOUNTING

16 11 030 REMOVING AND INSTALLING FUEL TANK (40-LITRE TANK)

IMPORTANT: After installation of fuel tank/prior to first engine start-up:

• Check electrical resistance between metal filler bowl and wheel hub.

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- Measured value: approx. 0.65 ohms.
- Fill fuel tank with at least 5 liters of fuel.

Necessary preliminary tasks:

- Draw off fuel from fuel tank.
- Remove underbody panelling on left and right
- Remove exhaust system
- Remove heat shield
- Remove rear left wheel arch trim
- Disconnect parking brake Bowden cables from brake caliper

Release bolts (2) from rear axle carrier.

Installation:

Disengage parking brake Bowden cables from holders (1) and feed out through rear axle carrier.

NOTE: Parking brake Bowden cables remain suspended on handbrake lever.

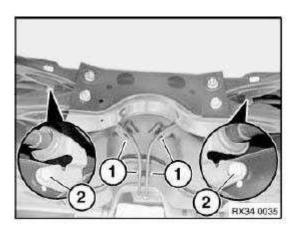


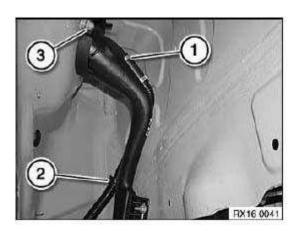
Fig. 2: Parking Brake Cables Holders And Bolts Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamp (1) and disengage filler vent line from holder (2).

Installation:

Replace hose clip.

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<u>Fig. 3: Hose Clamp And Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamp (1) and remove filler hose from fuel tank.

Installation:

Tightening torque: 16 11 4AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.

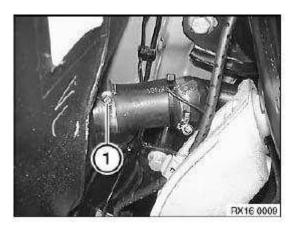


Fig. 4: Hose Clamp Courtesy of BMW OF NORTH AMERICA, INC.

Unlock quick-release fasteners (1) on carbon canister and detach.

Installation:

Make sure quick-release fasteners engage correctly.

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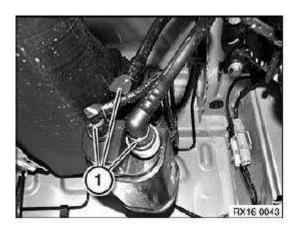


Fig. 5: Quick-Release Fasteners
Courtesy of BMW OF NORTH AMERICA, INC.

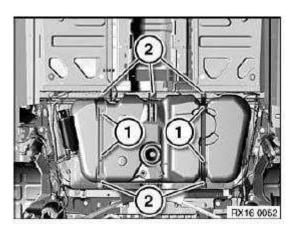
IMPORTANT: Secure fuel tank over a wide area with a suitable workshop jack and secure against falling down.

Remove expansion rivets (1).

Release screws (2) and lower fuel tank a little.

Installation:

Tightening torque: 16 11 3AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.



<u>Fig. 6: Lower Fuel Tank Rivets</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unlock quick-release fastener (2) and detach fuel feed line.

Pass filler vent line through body and slowly lower fuel tank.

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Installation:

Make sure that quick-release fastener is correctly engaged.

Make sure lines and wiring harness are not trapped or crushed during installation.

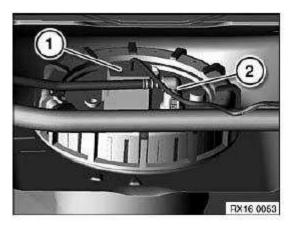


Fig. 7: Quick-Release Fastener And Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

The following components must be modified when the fuel tank is replaced:

- Fuel pump
- Carbon canister

16 11 060 REMOVING AND INSTALLING/REPLACING FUEL FILLER PIPE

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Observe country-specific safety regulations.

Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub.
- Measured value: approx. 0.65 ohms.
- Fuel tank must be filled with at least 5 liters of fuel.

Necessary preliminary tasks:

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- Draw off fuel from fuel tank, see 16 00 005 Draining and filling fuel tank
- Remove rear left wheel arch trim, see <u>51 71 041 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT WHEEL ARCH COVER</u>
- Remove left underbody panelling, see <u>51 47 ... REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT UNDERBODY PANELLING</u>
- Unscrew fuel filler cap from fuel filler pipe

Unfasten hose clip (1).

Detach fuel hose from fuel tank.

Installation:

Tightening torque: 16 11 4AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.

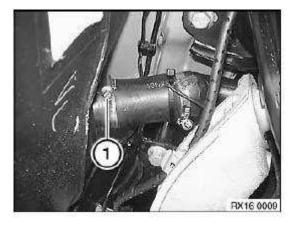


Fig. 8: Hose Clamp Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Installation:

Replace hose clip.

Unclip vent line from holder (2).

Unscrew nut (3).

Installation:

Replace nut.

Tightening torque: 16 11 1AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.

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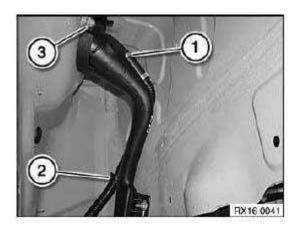


Fig. 9: Hose Clamp And Holder Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Installation:

Tightening torque: 16 11 1AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.

Wind grounding cable (2) back around fuel filler pipe.

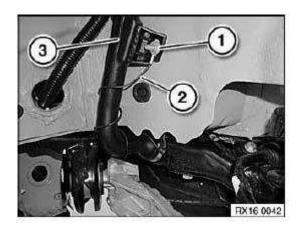
Remove fuel filler pipe (3).

Installation:

Make sure grounding cable (2) is correctly fitted.

Following seals must be correctly fitted:

- o Vent hose to fuel filler pipe
- o Fuel filler pipe to body cutout



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Fig. 10: Grounding Cable With Fuel Filler Pipe Courtesy of BMW OF NORTH AMERICA, INC.

16 11 071 REPLACING RUBBER SLEEVE BETWEEN FUEL FILLER PIPE AND FUEL TANK

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub.
- Measured value: approx. 0.65 ohms.
- Fuel tank must be filled with at least 5 liters of fuel.

Necessary preliminary tasks:

- Remove rear left wheel arch trim, see <u>51 71 041 REMOVING AND INSTALLING/REPLACING</u> REAR LEFT OR RIGHT WHEEL ARCH COVER
- Remove left underbody panelling, see <u>51 47 ... REMOVING AND INSTALLING/REPLACING</u> LEFT OR RIGHT UNDERBODY PANELLING
- Draw off fuel from fuel tank, see 16 00 005 Draining and filling fuel tank

Unscrew nut (1).

Installation:

Tightening torque: 16 11 1AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.

Make sure grounding cable (2) is correctly laid and secured.

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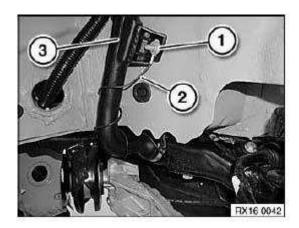


Fig. 11: Grounding Cable With Fuel Filler Pipe Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable tie (1).

Loosen hose clamps (2).

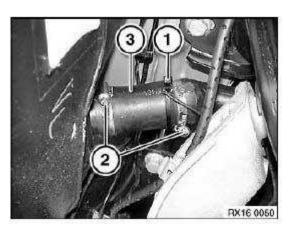
Detach rubber sleeve (3) first from fuel filler pipe and then from fuel tank.

Installation:

Tightening torque: 16 11 4AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.

Replace cable ties.

Make sure grounding cable is correctly fitted.



<u>Fig. 12: Hose Clamps And Rubber Sleeve</u> Courtesy of BMW OF NORTH AMERICA, INC.

16 11 090 REMOVING AND INSTALLING OR REPLACING DELIVERY UNIT (40-LITRE TANK)

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Special tools required:

• <u>16 1 020 PIN WRENCH</u>

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Observe country-specific safety regulations.

Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

Fill fuel tank with at least 5 liters of fuel.

Necessary preliminary tasks:

- Draw off fuel from fuel tank, see 16 00 005 Draining and filling fuel tank
- Remove rear seat

Fold carpet forwards slightly.

Release nuts (1) and remove cover (2).

Installation:

Tightening torque: 16 11 2AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.

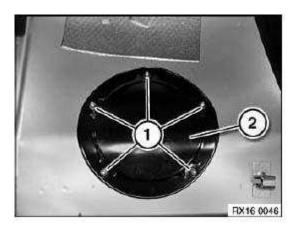


Fig. 13: Delivery Unit Cover And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

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Disconnect plug connection (1).

Unlock and disconnect quick-connect coupling (2).

Installation:

Make sure that quick-release fastener is correctly engaged.

IMPORTANT: Catch escaping fuel in a suitable container.

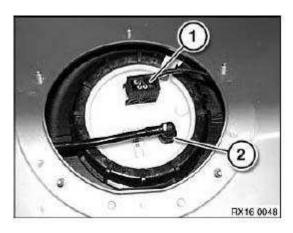


Fig. 14: Plug Connection And Quick-Connect Coupling Courtesy of BMW OF NORTH AMERICA, INC.

Release screw cap (1) with special tool 16 1 020.

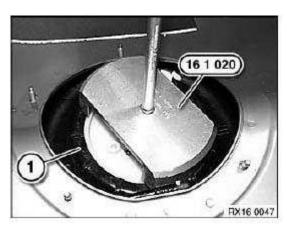
Installation:

Replace screw cap (1).

Replace rubber gasket.

Tightening torque: 16 14 2AZ, see 16 14 FUEL PUMP.

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<u>Fig. 15: Special Tool (16 1 020) With Screw Cap</u> Courtesy of BMW OF NORTH AMERICA, INC.

Carefully feed fuel pump (1) out of tank.

IMPORTANT: Do not bend sensor.

Catch escaping petrol/gasoline.

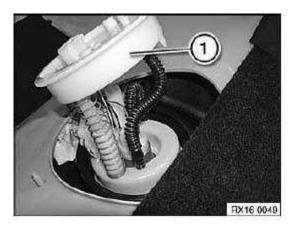


Fig. 16: Feed Fuel Pump Courtesy of BMW OF NORTH AMERICA, INC.

12 FUEL TRANSFER, SENSOR FOR GAUGE

16 12 010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (40-LITRE TANK)

Necessary preliminary tasks:

• Remove rear right wheel arch trim, see <u>51 71 041 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT WHEEL ARCH COVER</u>

Unlock and detach quick-connect couplings (1).

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Installation:

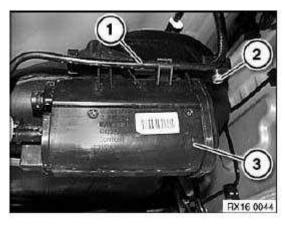
Make sure quick-release fasteners engage correctly.



<u>Fig. 17: Quick-Release Fasteners</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1).

Release screw (2) and swing out carbon canister (3).



<u>Fig. 18: Unclip Line And Carbon Canister</u> Courtesy of BMW OF NORTH AMERICA, INC.

14 FUEL PUMP

16 14 017 REMOVING AND INSTALLING/REPLACING FUEL FILTER WITH FUEL LEVEL SENSOR (50-LITRE TANK)

Special tools required:

• 16 1 020 PIN WRENCH

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Necessary preliminary tasks:

- Drain fuel tank, see 16 00 005 Draining and filling fuel tank
- Remove rear seat
- Remove complete sensor unit (left)

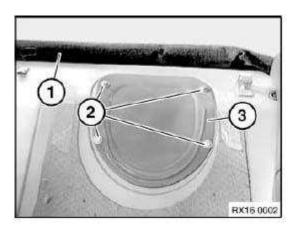
Push trim panel (1) forward.

Unfasten screws (2).

Installation:

Tightening torque: 16 11 2AZ, see 16 11 FUEL TANK AND FASTENING ELEMENTS.

Remove the cover (3).



<u>Fig. 19: Trim Panel And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and withdraw fuel hose.

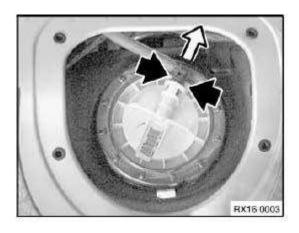


Fig. 20: Locating Fuel Hose

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Courtesy of BMW OF NORTH AMERICA, INC.

Release locking ring with special tool 16 1 020.

Installation:

Replace rubber seal.

Tightening torque: 16 14 1AZ, see 16 14 FUEL PUMP.

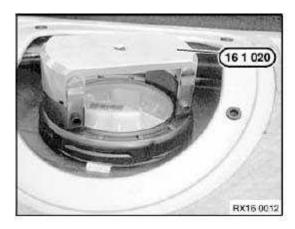


Fig. 21: Special Tool (16 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove line holder from sensor unit. Lift sensor unit and lines out of fuel tank.



Fig. 22: Removing Line Holder From Sensor Unit Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing fuel filter, make sure lug (1) engages in recess (2) on tank.

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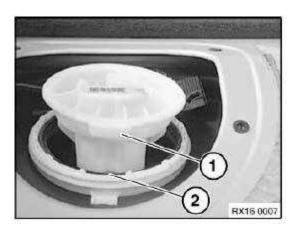


Fig. 23: Fuel Filter
Courtesy of BMW OF NORTH AMERICA, INC.

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General Electrical System - Repair Instructions - Cooper

00 TROUBLESHOOTING

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

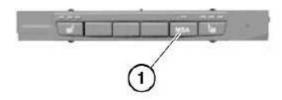
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 1: Identifying MSA Button Courtesy of BMW OF NORTH AMERICA, INC.

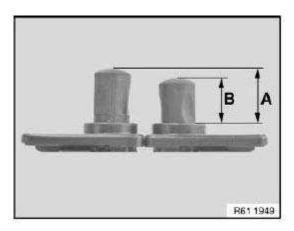
- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.



<u>Fig. 2: Identifying Engine Hood/Bonnet Dimension</u> Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

NOTE: For further information on automatic engine start-stop system (MSA):

• Refer to <u>ENGINE ELECTRICAL SYSTEM - REPAIR INSTRUCTIONS - 2007</u> HATCHBACK.

12 00 ... INSTRUCTIONS ON STARTING AID

Do not start the engine with help of starting sprays.

Preparation:

Conform with the following when starting engine with starting cable.

- o Ensure that jump lead wires are to appropriate cross-section size.
- o Only use fuse-protected jump leads.
- o Check whether the current supplying battery has 12 V voltage.
- o If engine is started from battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

CAUTION: Never touch ignition system components and current - dangerous high tension!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Carrying out:

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Always conform with the procedures to avoid injury to persons or damage to parts.

- o On automatic transmission, select "P" setting, apply handbrake.
- o Move the shift lever of vehicles with manual transmission into neutral and apply the parking brake.
- o Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- o First connect positive terminals of both batteries with one jump lead (red).
- o Use positive connection point in engine compartment for vehicles with one battery in trunk.
- o Then attach second jump lead (black) to negative terminal of donor battery and to engine ground or body ground on vehicle to be started.

CAUTION: Never connect second jump lead (black) to negative terminal of battery in vehicle to be started. This would produce explosive gas which could be ignited by sparks.

Danger of explosion!

After engine of vehicle to be started has started up, first disconnect the jump lead on the negative terminal/ground connection. Then remove jump lead from positive terminals.

61 00 ... BATTERY

Battery care and maintenance

In low-maintenance batteries, check the acid level at least once a year. If necessary, top up with distilled water up to the top marking.

The increasing number of electronic control units in the car reduces the self-discharging time of the battery (even in standby mode). To maintain the battery service life and to avoid exhaustive discharging, recharge laid-up vehicles every 6 weeks at the latest. The time for self-discharging depends on vehicle type and equipment specification.

Battery test

The battery acid density can be used to measure the charge state. However this test produces uncertainty caused by a design-related range of variation. The acid density e.g. for a charged battery is 1.28 kg/l (in the tropical version the acid density is 1.23 kg/l).

Another interference factor is the acid lamination immediately after filling with distilled water.

Battery wear with partially sulphated and/or heavily contaminated plates will also lead to incorrect acid density test results.

61 00 ... DIAGNOSIS FOR CONDITION BASED SERVICE

NOTE: Red symbol for pre-delivery check

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The vehicle is coded at the end of the assembly line so that the red symbol for the pre-delivery check is shown in the Next Service display (same symbol as vehicle check).

The symbol is a reminder to the Service staff that the pre - delivery check has not yet been carried out on this car.

NOTE: Do not carry out a reset.

Do **not** confuse this function with the "Vehicle check" maintenance scope.

Do not carry out a reset via the instrument cluster.

When carrying out the pre-delivery check with the "Transport Mode/Pre-delivery check" service function:

The symbol is automatically removed from the display after the service function has been executed.

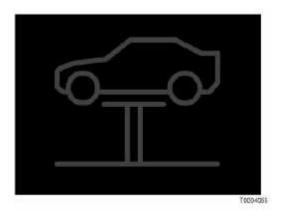
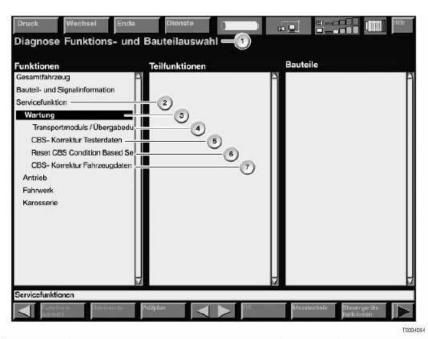


Fig. 3: Display Of Red Symbol For Pre-Delivery Check Courtesy of BMW OF NORTH AMERICA, INC.

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Key	Explanation	Key	Explanation	
1	Function and component selection	2	Service functions	
3 5	Maintenance CBS Correction Tester Data	6	Transport Mode/Pre-delivery check Reset CBS Condition Based Service	

Fig. 4: Display Of Diagnose Functions
Courtesy of BMW OF NORTH AMERICA, INC.

4 service functions are available in the BMW diagnosis system for maintenance:

- o Transport Mode/Pre-delivery check
- CBS Correction Tester Data
- Reset CBS
- CBS Correction Vehicle Data

Service function: Transport Mode/Pre-delivery check

To be able to hand over a vehicle to the customer in proper working order, it is essential to execute the "Transport Mode/Pre-delivery check" service function.

The following items are worked through during the pre-delivery check:

- o Deactivation of transport mode.
- An adaptation process must be activated in order to determine the vehicle-specific mileage/kilometrage per week. Transport and immobilization periods before the vehicle is delivered to the customer therefore have no effect on the customer-specific weekly mileage/kilometrage.

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The weekly mileage/kilometrage is used to control escalation from "green" to "yellow" (approx. 4 weeks before "red") for maintenance scopes with remaining distances. The averaged mileage/kilometrage of the last 6 weeks is taken into account here.

- Coding or blanking out of the legally prescribed intervals for the statutory vehicle inspection and statutory exhaust emissions test.
- o Input of the target dates for the statutory vehicle inspection and the statutory exhaust emissions test (automatic or manual).

Automatic: By input of the date of first registration and of the time interval

Manual: By direct input of the target date

o Entry of local, service-related phone numbers, depending on vehicle equipment specification (e.g. BMW Group Mobile Service, BMW Hotline, customer's home dealer).

The country-specific phone numbers are displayed in the BMW diagnosis system as a reference text. The phone numbers can simply be read off during the input prompt.

- o Reference to initialization of TeleService, depending on vehicle equipment specification.
- o Checking and if necessary setting of the on-board date for the vehicle.
- o Entry of the date for first registration of the vehicle.
- o Now clear the fault memory.

NOTE: Reducing input expenditure.

Standardized data are stored in the BMW diagnosis system (for repeated use) in the interests of minimizing the time spent on making inputs in the garage/workshop. The standardized data can be changed with the "CBS Correction Tester Data" service function.

Service function: CBS Correction Tester Data

Data are automatically stored in the vehicle with the "Pre-delivery check" service function.

The standardized data can be changed with the "CBS Correction Tester Data" service function.

The following standardized data can be changed:

- Phone numbers:
 - BMW Group Mobile Service
 - BMW Hotline
 - Customer's home dealer

The country-specific phone numbers are contained as reference texts in the BMW diagnosis system (read off during the input prompt). The phone numbers must be input with the international dialling code.

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- Legally prescribed vehicle inspection (country-specific):
 - Coding or blanking out
 - Interval for calculating the target date

The target date is calculated on the basis of the date of first registration.

- Legally prescribed exhaust emissions test (country-specific):
 - Coding or blanking out
 - Interval for calculating the target date

The target date is calculated on the basis of the date of first registration.

NOTE: Automatic function after installation of the BMW diagnosis system.

The standardized data are automatically established when the pre-delivery check is carried out for the first time. It is therefore not necessary to input the data separately.

Service function: Reset CBS Condition Based Service

A maintenance scope can be reset with the "Reset CBS Condition Based Service" service function. Even when availability is over 80 %.

The benefit of reset via the BMW diagnosis system is that the on-board date is corrected automatically.

The individual maintenance scopes are displayed in the BMW diagnosis system with service counter and availability.

o The service counter is reset by one counter on resetting. All service counters are set to "1" on new vehicles

The service counters are used in the Service Acceptance/Reception Module (SAM) on a scope-specific basis for controlling additional work.

o Availability is set to 100 % on resetting. Availability in % is the wear value of the maintenance scope.

The greater the availability, the longer it is to the next maintenance scope.

0 % means that the maintenance measure must be carried out.

Service function: CBS Correction Vehicle Data

IMPORTANT: The data are overwritten.

Once this service function has been executed, it is no longer possible to reconstruct the previous status.

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The "CBS Correction Vehicle Data" service function is available if a reset has been carried out **erroneously**. In this way, the availability of a maintenance scope can be corrected to a realistic value.

A data or a mileage/kilometer reading is entered for correction. These data are converted internally into an availability in %. In so doing, the BMW diagnosis system only accepts a smaller value as the current reading in the control unit. In addition, the service counter of the scope is automatically reduced by one counter.

The inputs are used in the Service Booklet to determine the realistic availability. A realistic availability can be reconstructed on a scope-specific basis by means of the last maintenance measure (with mileage/km reading and date).

This does not include correcting the availability for brake pads. The brake pad residual thickness must be measured and input (in millimeters).

NOTE: Reference for distance-and time-dependent maintenance scopes

For a correction, the availability is referred to the distance - and time-dependent calculation.

61 00 ... NOTES ON HANDLING OPTICAL FIBERS

CAUTION: To avoid damage when handling optical fibers, comply with the following points:

- The minimum permitted bending radius is 25 mm
- Do not subject optical fibers to compressive and tensile load
- Protect optical fibers against the effects of heat > or =85°C (e.g. during welding work, drying work with infrared heater or hot air blower)
- Optical fibers are permitted to show only one junction point (bridge), replace optical fibers if necessary

NOTE: The optical fibers are colored differently as follows:

- Green=MOST (M edia O riented S ystems T ransport) optical fibers
- Yellow=ISIS (I ntelligent S afety and I ntegration S ystem) optical fibers
- Orange=repair optical fibers

Follow instructions for processing cables and optical fibers. See <u>61 13 ... TREATING CABLES AND FIBRE-OPTIC CABLES</u>.

61 00 ... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be

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replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations:

Safety regulations for handling components of airbag system.

Instructions for disconnecting and connecting battery.

Procedure for cable repair

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colors. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts. Refer to <u>13 PLUG</u> <u>CONNECTION, TERMINALS</u>.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts. Refer to <u>13 PLUG</u> CONNECTION, TERMINALS.

61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY

Battery acid is highly corrosive:

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Do not allow any battery acid to come into contact with the eyes, the skin or clothing. Therefore wear protective clothing, gloves and goggles.

Do not tilt the battery, acid may emerge from the vent opening.

In event of contact with acid:

If acid is splashed into the eyes, rinse them immediately for several minutes with clear water. You must then consult a doctor without delay.

If acid is splashed onto the skin or clothing, neutralize it immediately with a soapy solution and rinse with lots of water.

Seek medical attention immediately if battery acid is accidentally swallowed.

Explosion hazard:

Strictly no flames, sparks, naked light or smoking!

A highly explosive mixture of electrolytic gas is created when batteries are charged. The rooms where charging is carried out must therefore always be well ventilated.

Avoid the formation of sparks when handling cables, wiring and electrical devices.

Turn the ignition lock to the 0 position before disconnecting or connecting the battery.

Do not place tools or any similar object on the battery (danger of short-circuiting and explosion!).

61 12 ... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: Do not connect continuous trickle charger to the cigarette lighter.

The cigarette lighter is powered by the rear distribution box via a relay. This relay drops out after terminal 15 OFF. This means that a continuous trickle charger connected to the cigarette lighter is disconnected from the battery.

Charge the battery via the jump-start connection points. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

- o Do not introduce any additional connections at the battery negative terminal.
- o Do not modify the grounding cable.

The grounding cable also serves to dissipate heat.

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- o Do not establish any connection between the IBS and the sensor screw.
- o Do not use force when disconnecting the pole shoe from the battery terminal:
 - Do not pull on the grounding cable.
 - Do not place any tools under the IBS to lever off the pole shoe.
- o Do not use IBS connections as levers.
- o Use a torque wrench and set tightening torque in accordance with repair instructions.
- o Do not release or tighten down sensor screw (screw with Torx head).
- Avoid contact between IBS and ground.

WARNING: Danger of destruction to IBS and cables when battery is replaced

o The IBS and the cables can be destroyed by mechanical strain when the battery is replaced.

Therefore avoid mechanical strain.

- o The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- o Use the battery size (capacity) installed as standard when replacing the battery.
- o Register battery change via Service Function (Progman or DIS).
- o Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.
- o Always proceed in accordance with the repair instructions.

NOTE: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- o A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- \circ For this reason, only replace the IBS when a corresponding fault is entered in the DME or DDE.

61 13 OPENING PLUG HOUSINGS AND REMOVING CONTACTS OF DIFFERENT PLUG SYSTEMS

Special tools required:

- 61 0 300
- 61 0 400
- 61 1 150

Abbreviations and what they mean:

REFERENCE CHART

D 1.5 / 2.5	Round contacts of 1.5 mm or 2.5 mm diameter

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MDK 3plus	Miniature double flat spring contact		
JPT ELA	Junior Power Timer flat spring contacts with strand sealing		
DFK ELA	Double flat spring contacts with strand sealing		
Elo	Electronic contacts with and without strand sealing Manufacturer: Siemens		
Elo Power	Electronic contacts for heavy loads with and without strand sealing Manufacturer: Siemens		
MQS	Micro Quadlock System electronic contacts with and without strand sealing Manufacturer: AMP		
MPQ	Micro Power Quadlock electronic contacts for heavy loads with and without strand sealing Manufacturer: AMP		

Ultrasonic-welded connectors:

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

The contacts of these connectors cannot be replaced. Replace plug completely.

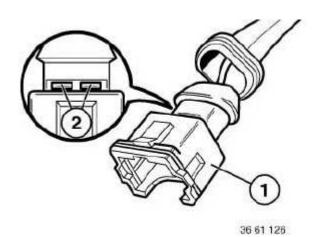


Fig. 5: Identifying Ultrasonic-Welded Connectors Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

Release and press-out tool 61 1 150

Replaced as from 09/2005 61 0 300

by: 61 0 400

Repair instructions for opening plug housings and removing contacts of different plug systems

Plug system D 1.5/D 2.5:

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- Circular plugs, 7 -, 8-pin, System D 2.5
- Circular plugs, 13-pin, System D 2.5
- Circular plugs, 20-pin, System D 2.5
- Circular plugs, 4 -, 7-, 10 -, 12 -, 25-pin, System D 1.5/D 2.5
- In-line plugs, 15-pin, System D 2.5
- In-line plugs, 8-, 12-pin, System D 2.5
- In-line plugs, 30-pin, System D 2.5
- In-line plugs, 20-pin, System D 2.5

Plug system JPT/MDK/DFK:

- In-line plugs, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Plug system Elo/Elo-Power:

- In-line plugs, 4-, 10-pin, System Elo
- In-line plugs, 6- to 50-pin, System Elo
- In-line plugs, 3-, 6-pin, System Elo-Power 2.8

Plug system MQS/MPQ:

- In-line plugs, 6-, 8-pin, System MQS
- In-line plugs, 2-pin, System MPQ 2.8
- Control unit plugs, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo-Power
- In-line plugs, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio plug), Hybrid System MQS/MPQ

61 13 .. UNLOCKING AND DISCONNECTING DIFFERENT PLUG CONNECTIONS

NOTE: Examples of unlocking and disconnecting different plug connections.

Press lock and open clip in direction of arrow.

Disconnect plug connection.

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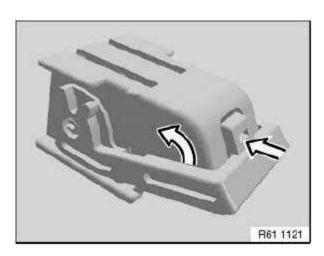


Fig. 6: Pressing Lock Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and open clip in direction of arrow.

Disconnect plug connection.

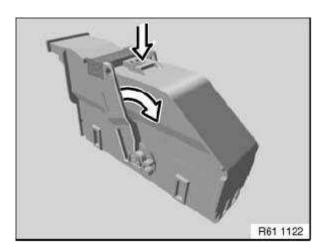
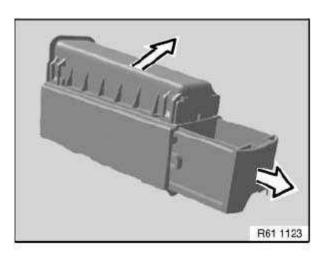


Fig. 7: Pressing Lock Courtesy of BMW OF NORTH AMERICA, INC.

Open clip in direction of arrow and disconnect plug connection in direction of arrow.

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<u>Fig. 8: Disconnecting Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

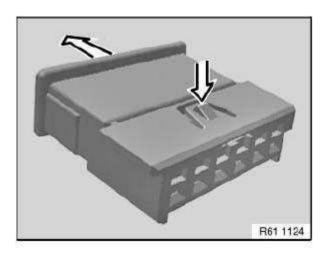
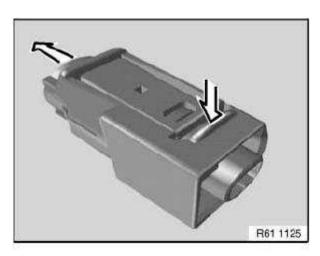


Fig. 9: Disconnecting Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

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<u>Fig. 10: Pressing Lock And Disconnect Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

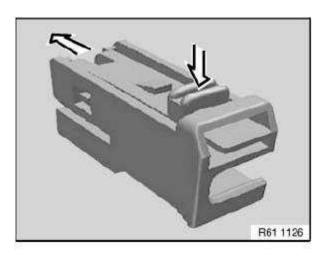
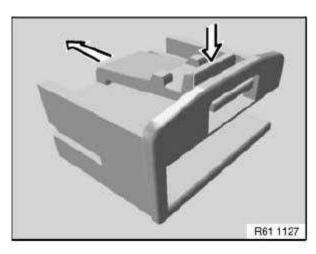


Fig. 11: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

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<u>Fig. 12: Pressing Lock And Disconnect Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

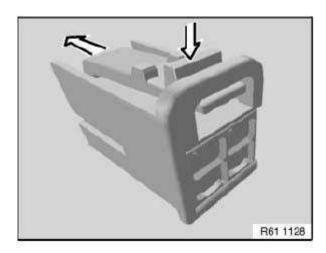


Fig. 13: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

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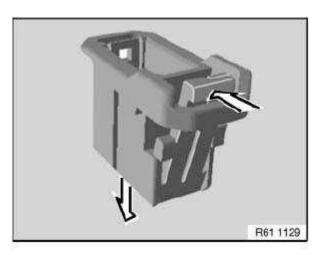


Fig. 14: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... TREATING CABLES AND FIBRE-OPTIC CABLES

Special tools required:

- 61 1 190
- 61 4 320

NOTE:

Special tools referred to in the repair instructions below are contained in the following special tool kits:

SPECIAL TOOLS REFERENCE CHART

Repair range for vehicle electrical system	SI 2 04 07 341
Crimping set with tool for fibre-optic cables, Micro Power Quadlock (MPQ), Micro Quadlock System (MQS) contacts and universal crimping head	61 4 320
Insulation displacement tool for ribbon cable	61 1 190

Subject of repair instructions

- Refer to SPECIAL TOOLS FOR WIRING HARNESS REPAIRS.
- Refer to **CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES**.
- Refer to 61 13 CRIMPING STOP PARTS.
- Refer to 61 13 BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION.
- Refer to 61 13 INSTALLING FAN CONNECTOR FOR RETROFITTING/REPAIRS.
- Aerial elbow plug on radio receiver.
- Refer to <u>61 13 ... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES</u> TO LENGTH.
- Refer to 61 13 ... CRIMPING OPTICAL FIBRES

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Insulation displacement connector for repairing ribbon cables. Refer to 61 13 ... REPAIRING RIBBON CABLES.

61 20 908 PERFORMING BATTERY "POWER RESET" (FOR PROGRAMMING/CODING CONTROL UNIT(S))

IMPORTANT: Observe 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

The following steps must be carried out for a "power reset":

- Switch off and disconnect battery charger
- Switch off ignition

Cars with ignition key: Turn ignition key to 0 position

Cars with identification sensor: Remove identification sensor from slot

Cars with comfort access system: Make sure terminal is in 0 position

- Disconnect battery negative terminal
- Reconnect battery negative terminal (to ensure bus activity)
- Waiting time (5-10 seconds)
- Disconnect battery negative terminal
- Waiting time (1 minute)
- Connect battery negative terminal and tighten. Refer to <u>GENERAL ELECTRICAL SYSTEM TIGHTENING TORQUES</u>.
- Connect and switch on battery charger
- Switch ignition on

12 AUXILIARY CABLE

61 12 ... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: Do not connect continuous trickle charger to the cigarette lighter.

The cigarette lighter is powered by the rear distribution box via a relay. This relay drops out after terminal 15 OFF. This means that a continuous trickle charger connected to the cigarette lighter is disconnected from the battery.

Charge the battery via the jump-start connection points. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

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- o Do not introduce any additional connections at the battery negative terminal.
- o Do not modify the grounding cable.

The grounding cable also serves to dissipate heat.

- o Do not establish any connection between the IBS and the sensor screw.
- o Do not use force when disconnecting the pole shoe from the battery terminal:
 - Do not pull on the grounding cable.
 - Do not place any tools under the IBS to lever off the pole shoe.
- Do not use IBS connections as levers.
- Use a torque wrench and set tightening torque in accordance with repair instructions.
- o Do not release or tighten down sensor screw (screw with Torx head).
- Avoid contact between IBS and ground.

WARNING: Danger of destruction to IBS and cables when battery is replaced

o The IBS and the cables can be destroyed by mechanical strain when the battery is replaced.

Therefore avoid mechanical strain

- o The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- Use the battery size (capacity) installed as standard when replacing the battery.
- o Register battery change via Service Function (Progman or DIS).
- o Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.
- o Always proceed in accordance with the repair instructions.

NOTE: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- o A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- o For this reason, only replace the IBS when a corresponding fault is entered in the DME or DDE.

61 12 013 REPLACING BATTERY NEGATIVE LEAD

WARNING: Observe 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

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• Remove right cowl panel cover

Slacken nut (1) on battery negative terminal.

Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

Detach battery negative cable (3) upwards.

Release nut (2) and remove cable.

Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

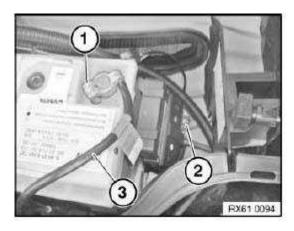


Fig. 15: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 180 REPLACING WIRING HARNESS ON FUNCTION CARRIER ON LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks:

- Remove front door trim panel
- Remove armrest from front door trim panel
- Remove cover on door handle
- Remove switch for door mirror
- Remove speaker trim from door trim panel
- Remove speaker

Disconnect plug connection (1).

Unclip wiring harness holders (2).

Feed out wiring harness out of function carrier and remove.

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Installation:

Make sure door wiring harness is correctly laid.

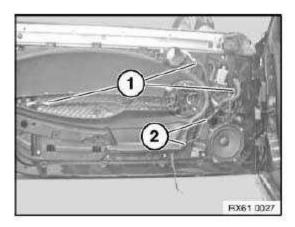


Fig. 16: Identifying Wiring Harness Holders And Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

61 12 200 REPLACING WIRING HARNESS IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks:

• Remove door trim panel carrier

Disconnect plug connection (1).

Unclip door wiring harness at points (2).

Installation:

Make sure door wiring harness is correctly laid.

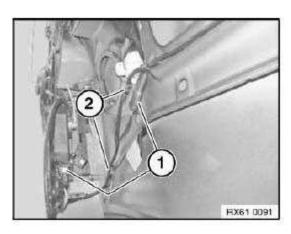


Fig. 17: Identifying Door Wiring Harness Points

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Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unclip door wiring harness at points (2).

Pull in rubber grommet (3) on inside of door.

Installation:

Make sure door wiring harness is correctly laid.

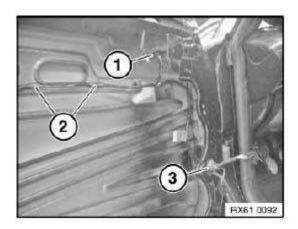


Fig. 18: Identifying Rubber Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), fold door wiring harness plug on A-pillar (2) downwards slightly and remove.

Disconnect plug connection behind.

Pull rubber grommet (3) out of front door.

Feed out door wiring harness towards front to A-pillar.

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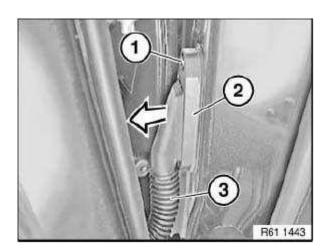


Fig. 19: Disconnecting Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

61 13 OPENING PLUG HOUSINGS AND REMOVING CONTACTS OF DIFFERENT PLUG SYSTEMS

Special tools required:

- 61 0 300
- 61 0 400
- 61 1 150

Abbreviations and what they mean:

REFERENCE CHART

D 1.5 / 2.5	Round contacts of 1.5 mm or 2.5 mm diameter	
MDK 3plus	Miniature double flat spring contact	
JPT ELA	Junior Power Timer flat spring contacts with strand sealing	
DFK ELA	Double flat spring contacts with strand sealing	
IHIO	Electronic contacts with and without strand sealing Manufacturer: Siemens	
	Electronic contacts for heavy loads with and without strand sealing Manufacturer: Siemens	
MQS	Micro Quadlock System electronic contacts with and without strand sealing Manufacturer: AMP	
MPQ	Micro Power Quadlock electronic contacts for heavy loads with and without strand sealing Manufacturer: AMP	

Ultrasonic-welded connectors:

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

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The contacts of these connectors cannot be replaced. Replace plug completely.

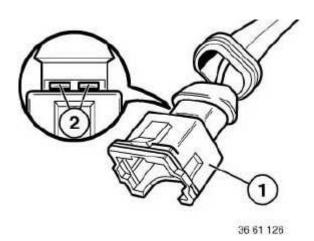


Fig. 20: Identifying Ultrasonic-Welded Connectors Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

Release and press-out tool 61 1 150

Replaced as from 09/2005 61 0 300

by: 61 0 400

Repair instructions for opening plug housings and removing contacts of different plug systems

Plug system D 1.5/D 2.5:

- Circular plugs, 7 -, 8-pin, System D 2.5
- Circular plugs, 13-pin, System D 2.5
- Circular plugs, 20-pin, System D 2.5
- Circular plugs, 4 -, 7-, 10 -, 12 -, 25-pin, System D 1.5/D 2.5
- In-line plugs, 15-pin, System D 2.5
- In-line plugs, 8-, 12-pin, System D 2.5
- In-line plugs, 30-pin, System D 2.5
- In-line plugs, 20-pin, System D 2.5

Plug system JPT/MDK/DFK:

- In-line plugs, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3plus 2.8

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• In-line plugs, 4-pin, System DFK ELA

Plug system Elo/Elo-Power:

- In-line plugs, 4-, 10-pin, System Elo
- In-line plugs, 6- to 50-pin, System Elo
- In-line plugs, 3-, 6-pin, System Elo-Power 2.8

Plug system MQS/MPQ:

- In-line plugs, 6-, 8-pin, System MQS
- In-line plugs, 2-pin, System MPQ 2.8
- Control unit plugs, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo-Power
- In-line plugs, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio plug), Hybrid System MQS/MPQ

61 13 .. UNLOCKING AND DISCONNECTING DIFFERENT PLUG CONNECTIONS

NOTE: Examples of unlocking and disconnecting different plug connections.

Press lock and open clip in direction of arrow.

Disconnect plug connection.

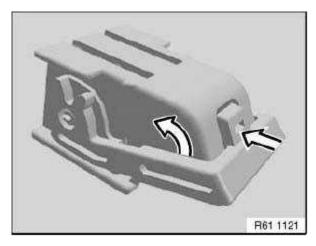


Fig. 21: Pressing Lock
Courtesy of BMW OF NORTH AMERICA, INC.

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Press lock and open clip in direction of arrow.

Disconnect plug connection.

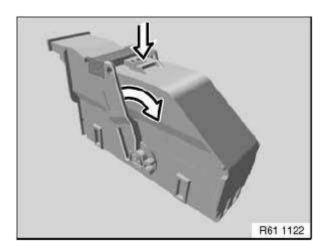
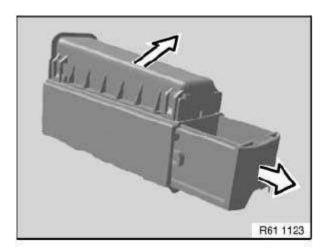


Fig. 22: Pressing Lock Courtesy of BMW OF NORTH AMERICA, INC.

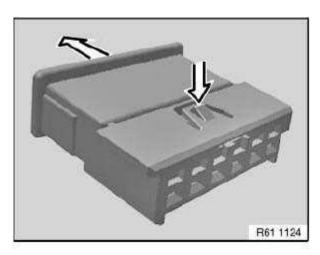
Open clip in direction of arrow and disconnect plug connection in direction of arrow.



<u>Fig. 23: Disconnecting Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

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<u>Fig. 24: Disconnecting Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

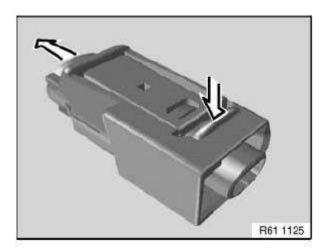
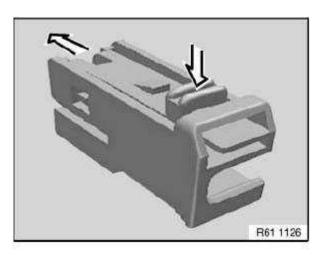


Fig. 25: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

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<u>Fig. 26: Pressing Lock And Disconnect Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

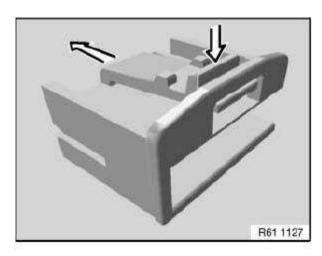
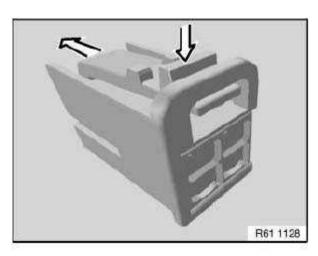


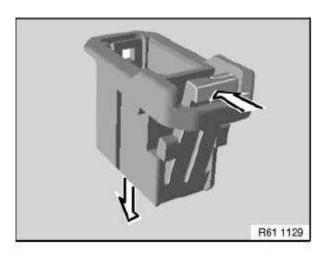
Fig. 27: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.



<u>Fig. 28: Pressing Lock And Disconnect Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.



<u>Fig. 29: Pressing Lock And Disconnect Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

13 PLUG CONNECTION, TERMINALS

61 00 ... NOTES ON HANDLING OPTICAL FIBERS

CAUTION: To avoid damage when handling optical fibers, comply with the following points:

- The minimum permitted bending radius is 25 mm
- Do not subject optical fibers to compressive and tensile load
- Protect optical fibers against the effects of heat > or =85°C (e.g. during welding work, drying work with infrared heater or hot air

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blower)

 Optical fibers are permitted to show only one junction point (bridge), replace optical fibers if necessary

NOTE: The optical fibers are colored differently as follows:

- Green=MOST (M edia O riented S ystems T ransport) optical fibers
- Yellow=ISIS (I ntelligent S afety and I ntegration S ystem) optical fibers
- Orange=repair optical fibers

Follow instructions for 61 13 ... TREATING CABLES AND FIBRE-OPTIC CABLES.

61 00 ... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations:

Safety regulations for handling components of airbag system. Refer to <u>MULTIPLE RESTRAINT SYSTEM -</u> **OVERVIEW** .

61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

Procedure for cable repair

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colors. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

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Refer to 61 13 CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES.

Repair plug connection using connectors.

Refer to 13 PLUG CONNECTION, TERMINALS.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Refer to 61 13 CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES.

Repair plug connection using connectors.

Refer to 13 PLUG CONNECTION, TERMINALS.

61 13 BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

Special tools required:

- 61 0 300
- 61 9 040

IMPORTANT:

- 1. Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).
- 2. Read out fault memory
- 3. Eliminate cause of damage.
- 4. Disconnect battery negative terminal
- 5. Make sure that no safety-related system according to connection scheme (e.g. anti-lock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)
- 6. Carry out function test and read out fault memories again
- 7. Eliminate new faults if applicable and clear fault memories

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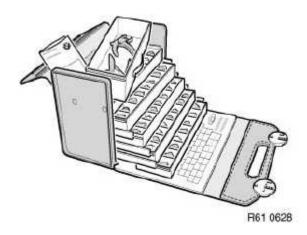
NOTE:

The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Service.

Special tools:

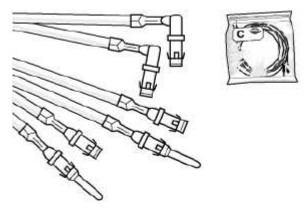
• Special tool 61 9 040



<u>Fig. 30: Wiring Repair Kit</u> Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.



R61 99 257

Fig. 31: Identifying Circular Plug Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

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- 1. Prepackaged end of cable with requisite wire cross-section
- 2. Crimp connector for selected wire cross-section
- 3. Shrink-fit hose

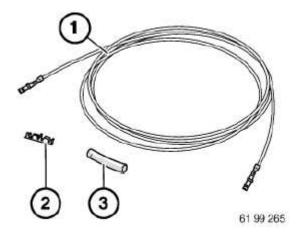


Fig. 32: Identifying Crimp Connector And Shrink-Fit Hose Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using relevant special tool contained in special tool kit 61 0 300 .

Refer to repair instructions:

OPENING PLUG HOUSINGS AND REMOVING CONTACTS of different plug systems

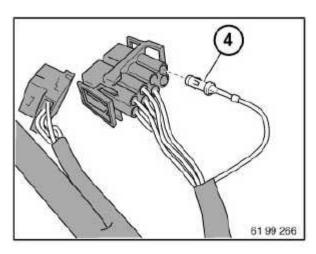


Fig. 33: Identifying Contact Mark
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

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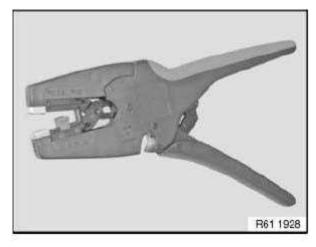
- Check maximum length of repair cable!
- If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.

Observe following procedure:

- Cut off wire with faulty contact at point which is easily accessible.
- Strip wiring-harness wire end (6).
- Cut preassembled wire end (7) to length and strip insulation.

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES



<u>Fig. 34: Identifying Cutting Plier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Crimp butt connector on preassembled wire end. Refer to 61 13 CRIMPING STOP PARTS.



61 99 270

Fig. 35: Identifying Crimp Butt Connector Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

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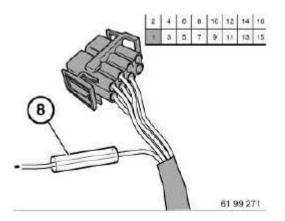


Fig. 36: Identifying Shrink-Fit Hose Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

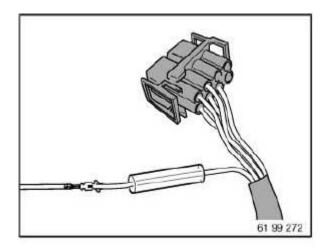


Fig. 37: Identifying Crimp Unused Wire End To Butt Connector Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

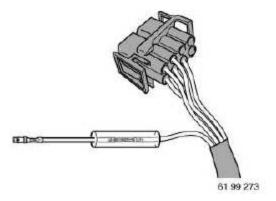


Fig. 38: Identifying Shrink-On Sleeve Over Butt Connector

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Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

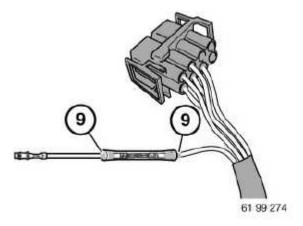


Fig. 39: Identifying Shrink-On Sleeve Courtesy of BMW OF NORTH AMERICA, INC.

61 13 CRIMPING STOP PARTS

Special tools required:

- 12 1 080
- 12 1 081
- 12 1 083
- 1. Crimping butt connectors and contact sleeves for fan connectors up to 2.5 mm². Refer to <u>61 13 BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION</u>.
- 2. Crimping butt connectors and contact sleeves for fan connectors from 2.5 mm²
- 3. Crimping contact sleeves for fan connectors 4 mm 2 and ignition cable contacts

Special tool kit 12 1 080 is used to fit ignition cable contacts and to crimp 4 mm² contact sleeves for fan connectors.

- 12 1 081 (hand crimping tool)
- 12 1 083 (matrix)

Refer to repair instructions:

SPECIAL TOOLS FOR WIRING HARNESS REPAIRS

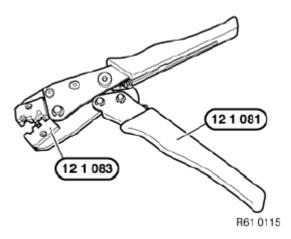


Fig. 40: Identifying Special Tools (12 1 081) And (12 1 083) Courtesy of BMW OF NORTH AMERICA, INC.

Unlock special tool 12 1 081:

Squeeze grips (1) lightly and push unlocking lever (2) in direction of arrow.

Or:

Compress handles as far as they will go, tool unlocks automatically.

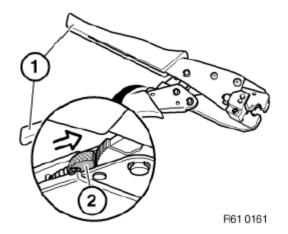
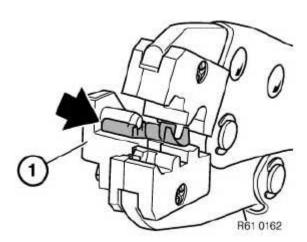


Fig. 41: Squeezing Grips Courtesy of BMW OF NORTH AMERICA, INC.

Insert contact sleeve 4 mm 2 in nest with lock (1) as far as it will go.



<u>Fig. 42: Identifying Contact Sleeve Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

Preload contact by squeezing matrix in crimping tool. Grip contact (1) firmly only, do not crimp.

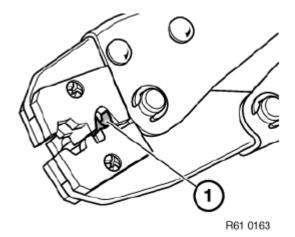


Fig. 43: Identifying Grip Contact Of Plier Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for cutting and stripping insulation from cables.

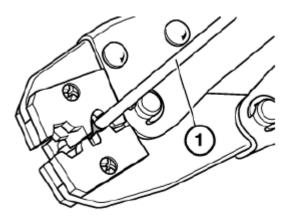
Insert stripped end of wire (7) in the contact. Ensure insulation and stripped wire end are correctly laid in contact.

Compress crimping tool as far as it will go.

Crimping tool unlocks automatically.

Take contact out of crimping tool.

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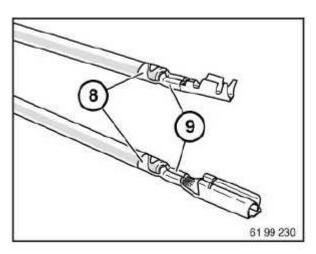
R61 0164

Fig. 44: Identifying Stripped End Of Wire Courtesy of BMW OF NORTH AMERICA, INC.

4. Checking crimping

Check insulation crimp (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

NOTE: Illustration shows butt connectors and contact sleeves for fan connectors knocked on one side. The crimping procedure is identical here.



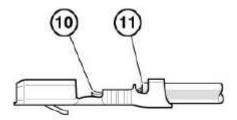
<u>Fig. 45: Identifying Insulation Crimp And Wire Crimp</u> Courtesy of BMW OF NORTH AMERICA, INC.

Correct crimping:

Visible conductor end (10).

Visible insulation end (11).

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61 99 231

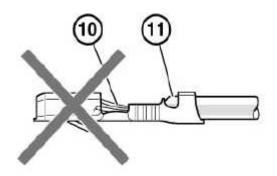
Fig. 46: Identifying Correct Crimping Courtesy of BMW OF NORTH AMERICA, INC.

Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.



61 99 232

Fig. 47: Identifying Incorrect Crimping Courtesy of BMW OF NORTH AMERICA, INC.

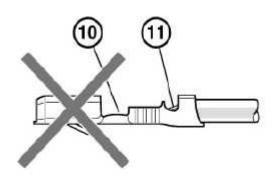
Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

If necessary, repeat crimping with a new contact.

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61 99 233

Fig. 48: Identifying Incorrect Crimping Courtesy of BMW OF NORTH AMERICA, INC.

61 13 CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

Stripped length:

STRIPPED LENGTH SPECIFICATION

Wire cross-section (mm ²)	Stripped length (mm)
0.35 0.50	4.0
0.75 1.00	4.5
1.00 2.50	5.0

61 13 ... DME MASTER RELAY CONNECTOR

Unlock locking flap (1) of corresponding cable.

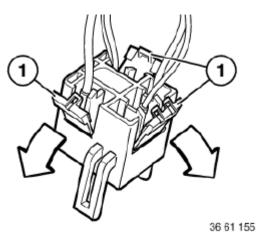
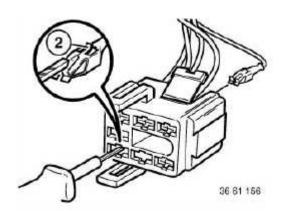


Fig. 49: Unlocking Locking Flap

Courtesy of BMW OF NORTH AMERICA, INC.

With special tool 61 1 136 or 61 1 137 (ejector), press back arrester hook (2) of appropriate contact and pull out cable.

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<u>Fig. 50: Identifying Arrester Hook</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 13 INSTALLING FAN CONNECTOR FOR RETROFITTING/REPAIRS

Special tools required:

- 61 9 040
- 61 9 041
- 61 9 042

NOTE:

The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Service.

Special tools:

• special tool 61 9 040

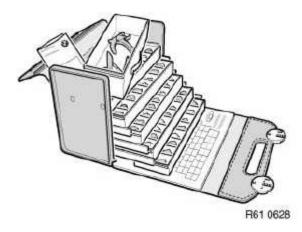
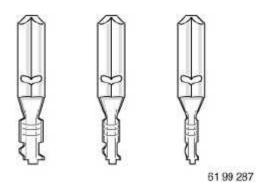


Fig. 51: Wiring Repair Kit

Courtesy of BMW OF NORTH AMERICA, INC.

Choose contact sleeve (up to 4 mm 2) in accordance with wire cross-section.



<u>Fig. 52: Identifying Contact Sleeve With Wire Cross-Section</u> Courtesy of BMW OF NORTH AMERICA, INC.

Alternatively:

Choose contact sleeves (up to 2.5 mm²) for fan connectors.

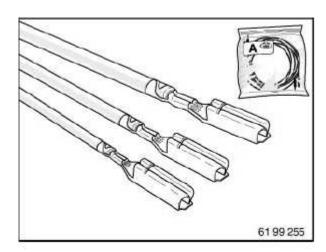


Fig. 53: Identifying Contact Sleeve For Fan Connectors Courtesy of BMW OF NORTH AMERICA, INC.

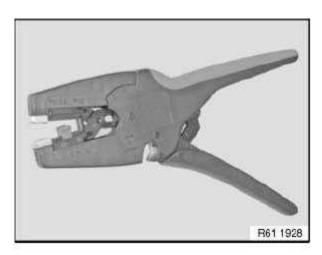
Cut through wire loop in wiring harness at established point.

Strip insulation from both wire ends.

Refer to repair instructions:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

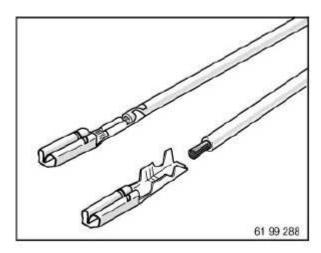
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<u>Fig. 54: Identifying Cutting Plier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Crimp contact sleeves on both wire ends. Refer to 61 13 CRIMPING STOP PARTS.

NOTE: If using repair kit for contact sleeves, refer to repair instruction <u>BUTT</u> CONNECTOR FOR REPAIRING A PLUG CONNECTION.



<u>Fig. 55: Identifying Crimp Contact Sleeves</u> Courtesy of BMW OF NORTH AMERICA, INC.

Crimp connecting cable for retrofitting likewise with contact sleeve.

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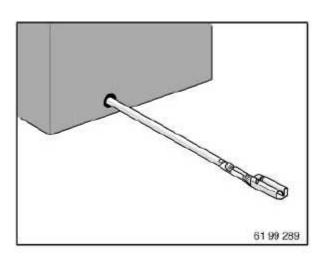


Fig. 56: Identifying Crimp Connecting Cable For Retrofitting Courtesy of BMW OF NORTH AMERICA, INC.

Cut required number of poles to length for fan connectors.

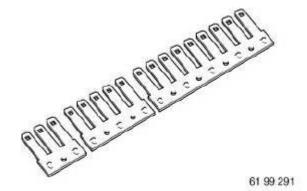


Fig. 57: Identifying Number Of Poles To Length For Fan Connectors Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 61 9 041 (hand crimping tool) in conjunction with 61 9 042 (matrix) are used for pushing contact sleeves onto fan connectors.

Refer to repair instructions:

SPECIAL TOOLS FOR WIRING HARNESS REPAIRS

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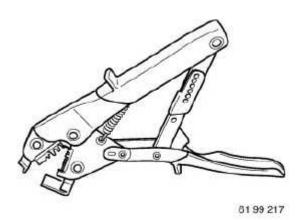


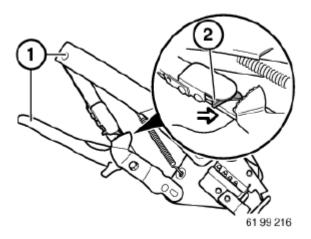
Fig. 58: Identifying Plier Courtesy of BMW OF NORTH AMERICA, INC.

Unlock special tool 61 9 041:

Squeeze grips (1) lightly and push unlocking lever (2) in direction of arrow.

Or:

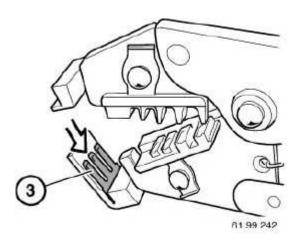
Compress handles as far as they will go, tool unlocks automatically.



<u>Fig. 59: Pushing Unlocking Lever</u> Courtesy of BMW OF NORTH AMERICA, INC.

Insert prepared fan connector (3) in special tool 61 9 041 / 61 9 042.

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<u>Fig. 60: Inserting Fan Connector</u> Courtesy of BMW OF NORTH AMERICA, INC.

Attach wire with contact sleeve to fan connector.

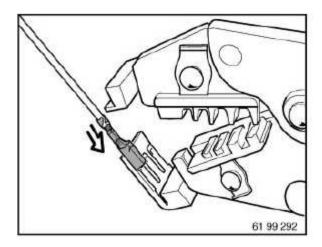


Fig. 61: Attaching Wire With Contact Sleeve To Fan Connector Courtesy of BMW OF NORTH AMERICA, INC.

Press crimping tool together and slide contact sleeve firmly home.

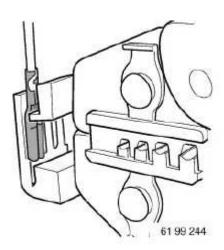


Fig. 62: Identifying Slide Contact Sleeve Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Once contact sleeves have been pushed on, they should not be detached again from the fan connector or reused.

Push on further contact sleeves for potential branching.

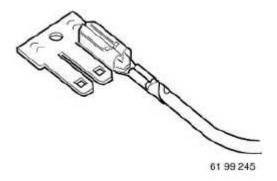


Fig. 63: Identifying Contact Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation in wet area (engine compartment, wheel arch):

Apply sealing compound on both sides and press into contacts (1).

Fit shrink-fit hose and heat up with hot air blower (2) (approx. 250°C).

NOTE: Ensure that fan connector has sufficient contact surface on mounting point.

Do not heat shrink-fit hose on edges of fan connector too strongly, risk of cracking.

Allow shrink-fit hose to cool down until hand-warm. Then press sealing material again into contacts and onto edges of fan connector.

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If necessary, carefully heat shrink-fit hose again.

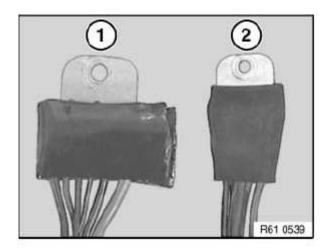


Fig. 64: Identifying Sealing Compound Courtesy of BMW OF NORTH AMERICA, INC.

Installation in dry area (interior, luggage compartment):

Slide assembled fan connector into insulation housing until it locks into place.

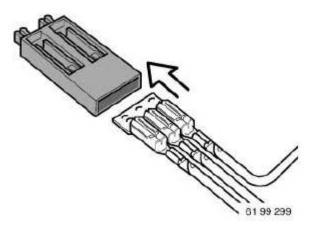


Fig. 65: Sliding Fan Connector Into Insulation Housing Courtesy of BMW OF NORTH AMERICA, INC.

61 13 OPENING PLUG HOUSINGS AND REMOVING CONTACTS OF DIFFERENT PLUG SYSTEMS

Special tools required:

- 61 0 300
- 61 0 400
- 61 1 150

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Abbreviations and what they mean:

REFERENCE CHART

D 1.5 / 2.5	Round contacts of 1.5 mm or 2.5 mm diameter	
MDK 3plus	Miniature double flat spring contact	
JPT ELA	Junior Power Timer flat spring contacts with strand sealing	
DFK ELA	Double flat spring contacts with strand sealing	
Elo	Electronic contacts with and without strand sealing Manufacturer: Siemens	
Elo Power	Electronic contacts for heavy loads with and without strand sealing Manufacturer: Siemens	
MQS	Micro Quadlock System electronic contacts with and without strand sealing Manufacturer: AMP	
MPQ	Micro Power Quadlock electronic contacts for heavy loads with and without strand sealing Manufacturer: AMP	

Ultrasonic-welded connectors:

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

The contacts of these connectors cannot be replaced. Replace plug completely.

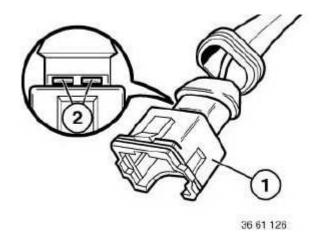


Fig. 66: Identifying Ultrasonic-Welded Connectors Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

Release and press-out tool 61 1 150

Replaced as from 09/2005 61 0 300

by: 61 0 400

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Repair instructions for opening plug housings and removing contacts of different plug systems

Plug system D 1.5/D 2.5:

- Circular plugs, 7 -, 8-pin, System D 2.5
- Circular plugs, 13-pin, System D 2.5
- Circular plugs, 20-pin, System D 2.5
- Circular plugs, 4 -, 7-, 10 -, 12 -, 25-pin, System D 1.5/D 2.5
- In-line plugs, 15-pin, System D 2.5
- In-line plugs, 8-, 12-pin, System D 2.5
- In-line plugs, 30-pin, System D 2.5
- In-line plugs, 20-pin, System D 2.5

Plug system JPT/MDK/DFK:

- In-line plugs, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Plug system Elo/Elo-Power:

- In-line plugs, 4-, 10-pin, System Elo
- In-line plugs, 6- to 50-pin, System Elo
- In-line plugs, 3-, 6-pin, System Elo-Power 2.8

Plug system MQS/MPQ:

- In-line plugs, 6-, 8-pin, System MQS
- In-line plugs, 2-pin, System MPQ 2.8
- Control unit plugs, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo-Power
- In-line plugs, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio plug), Hybrid System MQS/MPQ

61 13 SPECIAL TOOLS FOR WIRING HARNESS REPAIRS

Special tools required:

12 1 080

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- 61 0 200
- 61 0 210
- 61 0 220
- 61 0 230
- 61 0 300
- 61 0 400
- 61 1 190
- 61 4 320
- 61 9 041
- 61 9 044

Release and press-out tool:

- Special tool 61 0 300
- Special tool 61 0 400 (MINI N12/N14)

Handling:

• Opening plug housings and removing contacts of different plug systems



<u>Fig. 67: Identifying Special Tool Kit</u> Courtesy of BMW OF NORTH AMERICA, INC.

Refer to **CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES**.

Handling:

• Refer to **CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES**.

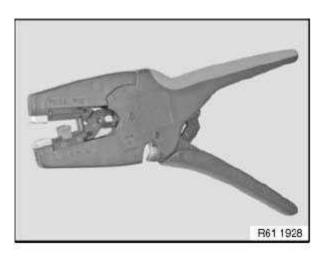


Fig. 68: Identifying Cutting Plier Courtesy of BMW OF NORTH AMERICA, INC.

Refer to 61 13 CRIMPING STOP PARTS.

- Special tool 61 4 320
 - 1. Tool without crimping head
 - 2. Crimping head (stripping insulation and cutting fibre-optic cables to length)
 - 3. Crimping head (crimping fibre-optic cable contacts)
 - 4. Crimping head (crimping MQS contacts)
 - 5. Crimping head (crimping MPQ contacts)
 - 6. Replacement blade (face-cutting fibre-optic cables)
 - 7. Replacement blade with tool (insulation stripping unit)
 - 8. Universal crimping head (SI 2 04 06 293)

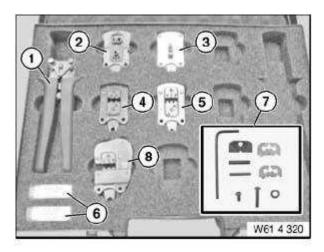


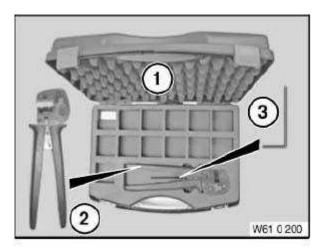
Fig. 69: Identifying Crimping Stop Parts (Small Contacts) Courtesy of BMW OF NORTH AMERICA, INC.

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Crimping stop parts (large contacts):

- Special tool 61 0 200 (crimping set)
- Special tool 61 0 210 (matrix set LSK 8)
- Special tool 61 0 220 (matrix set SLK 2.8)
- Special tool 61 0 230 (matrix set MAK 8 / DFK4)

Handling:



<u>Fig. 70: Identifying Crimping Stop Parts (Large Contacts)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Crimping antenna elbow plugs:

- Special tool 61 9 041 (hand crimping tool)
- Special tool 61 9 044 (matrix)

Handling:

• Antenna elbow plug on radio receiver

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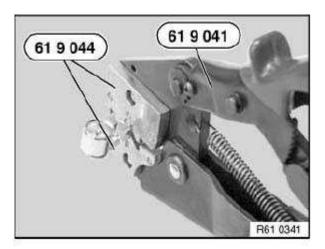


Fig. 71: Identifying Special Tools (61 9 044) And (61 9 041) Courtesy of BMW OF NORTH AMERICA, INC.

Repair kit for ignition cables and for crimping fan connector receptacles 4 mm²:

• Special tool 12 1 080

Handling:

• Refer to 61 13 CRIMPING STOP PARTS.



Fig. 72: Identifying Repair Kit For Ignition Cables And Crimping Fan Connector Courtesy of BMW OF NORTH AMERICA, INC.

Repairing ribbon cables:

• Special tool 61 1 190

Handling:

• Refer to 61 13 ... REPAIRING RIBBON CABLES

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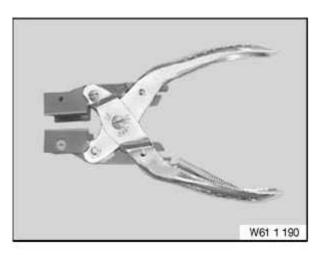


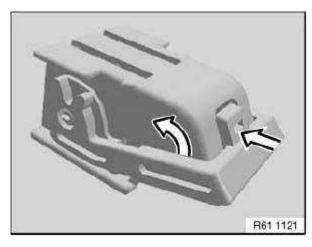
Fig. 73: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 .. UNLOCKING AND DISCONNECTING DIFFERENT PLUG CONNECTIONS

NOTE: Examples of unlocking and disconnecting different plug connections.

Press lock and open clip in direction of arrow.

Disconnect plug connection.



<u>Fig. 74: Pressing Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and open clip in direction of arrow.

Disconnect plug connection.

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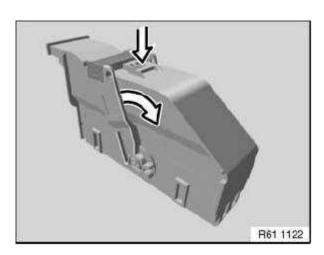


Fig. 75: Pressing Lock Courtesy of BMW OF NORTH AMERICA, INC.

Open clip in direction of arrow and disconnect plug connection in direction of arrow.

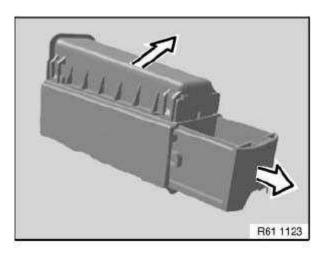
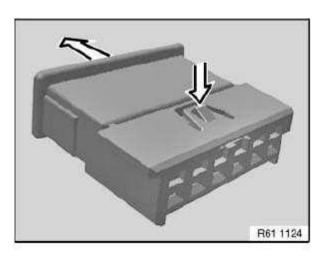


Fig. 76: Disconnecting Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

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<u>Fig. 77: Disconnecting Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

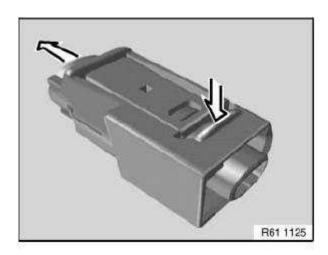
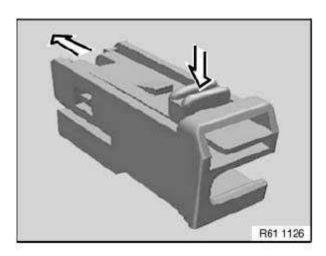


Fig. 78: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

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<u>Fig. 79: Pressing Lock And Disconnect Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

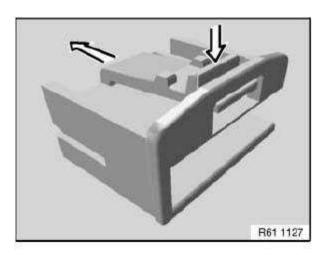


Fig. 80: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

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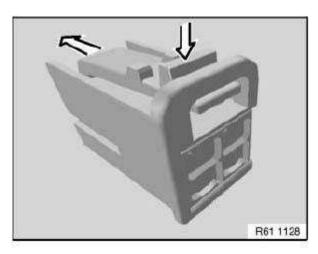


Fig. 81: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

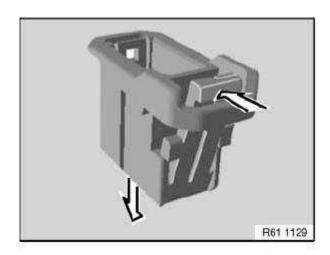


Fig. 82: Pressing Lock And Disconnect Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... BASE OF TAB CONNECTOR HOUSINGS

Unlock hook (1) with special tool 61 1 360 and slide plug housing downwards out of base.

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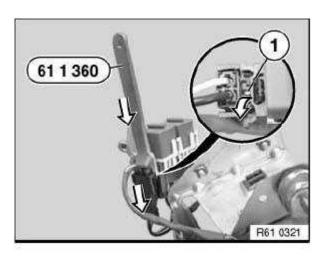


Fig. 83: Identifying Special Tools (61 1 360) Courtesy of BMW OF NORTH AMERICA, INC.

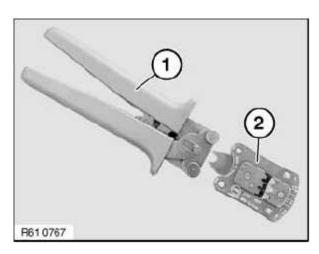
61 13 ... CRIMPING MICRO POWER QUADLOCK CONTACTS (MPQ)

Special tools required:

• 61 4 320

To crimp MPQ contacts, use pliers $61\ 4\ 321\ (1)$ in conjunction with crimping head $61\ 4\ 325\ (2)$ from crimping set $61\ 4\ 320$.

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.



<u>Fig. 84: Identifying Pliers And Crimping Head</u> Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (1).

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NOTE: Place contact (2) with utmost care in designated nest (observe cable cross-section) in crimping head (3). Make sure it is exactly positioned.

Place MPQ contact (2) in crimping head (3).

Close pliers (1) one notch.

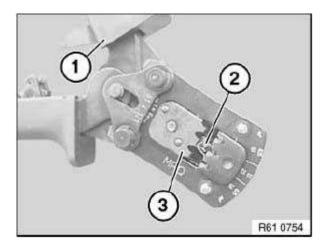


Fig. 85: Identifying MPQ Contact And Crimping Head Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for cutting and stripping insulation from cables.

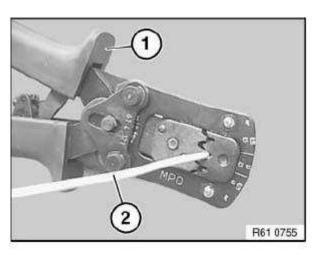
Insert stripped cable (2).

Close pliers (1) fully.

Open pliers (1) and remove cable (2).

NOTE: Check contact for correct crimping.

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<u>Fig. 86: Identifying MPQ Pliers</u> Courtesy of BMW OF NORTH AMERICA, INC.

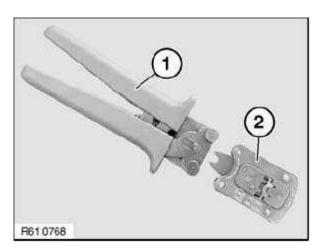
61 13 ... CRIMPING MICRO QUADLOCK SYSTEM CONTACTS (MQS)

Special tools required:

• 61 4 320

To crimp MQS contacts, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 324 (2) from crimping set 61 4 320 .

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.



<u>Fig. 87: Identifying Crimping Head Pliers</u> Courtesy of BMW OF NORTH AMERICA, INC.

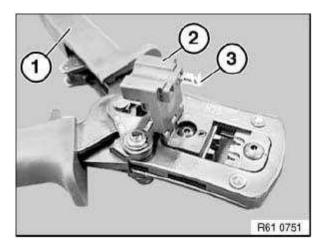
Open pliers (1).

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Fold up contact carrier (2).

Insert MQS contact (3) in contact carrier (2).

Fold back contact carrier (2).



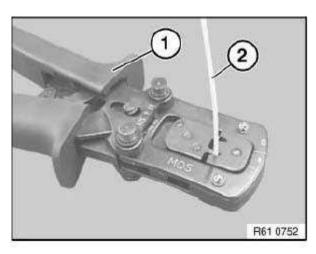
<u>Fig. 88: Identifying MQS Contacts In Contact Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for cutting and stripping insulation from cables.

Close pliers (1) one notch.

Insert stripped cable (2).

Close pliers (1) fully.



<u>Fig. 89: Identifying Pliers And Stripped Cable</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Open pliers (1).

Open contact carrier (2) gently and carefully remove MQS contact.

NOTE: Check contact for correct crimping.

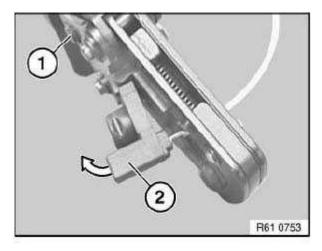


Fig. 90: Opening Pliers Contact Carrier Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CRIMPING ANNULAR CONTACTS

Special tools required:

• 61 4 320

Crimping annular contacts:

Special tool 61 4 320

61 13 ... CRIMPING OPTICAL FIBRES

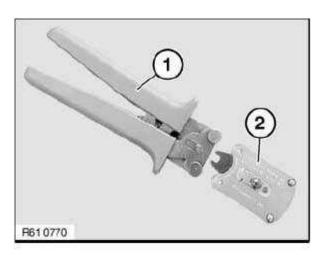
Special tools required:

• 61 4 320

To crimp optical fibres, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 323 (2) from crimping set 61 4 320 .

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

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<u>Fig. 91: Identifying Crimping Head Pliers</u> Courtesy of BMW OF NORTH AMERICA, INC.

Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).

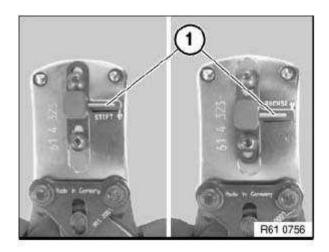


Fig. 92: Identifying Stop Lever Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

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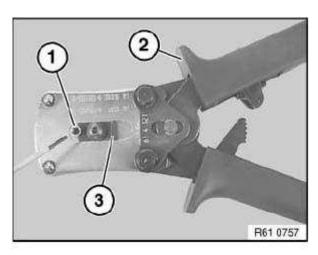


Fig. 93: Identifying Pin Contact Or Jack Courtesy of BMW OF NORTH AMERICA, INC.

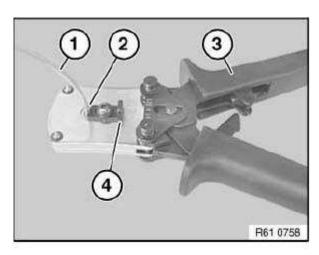
NOTE: Follow procedure for cutting and stripping insulation from optical fibres.

Insert stripped optical fibre (1) as far as it will go into pin contact or jack (2).

Close pliers (3) fully.

Open pliers (3) and locking lever (4).

Remove optical fibre (1).



<u>Fig. 94: Identifying Stripped Optical Fibre</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure optical fibre is correctly seated in jack.

Right (A)

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End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).

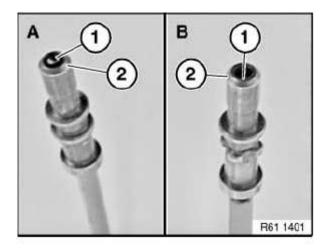


Fig. 95: Identifying End Of Optical Fibre Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH

Special tools required:

• 61 4 320

To cut off, strip insulation and cut optical fibres to length, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 322 (2) from crimping set 61 4 320 .

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

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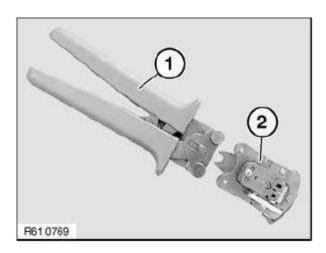


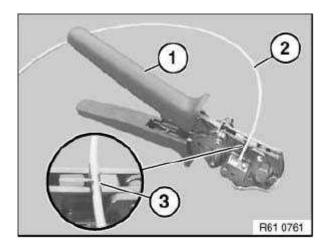
Fig. 96: Identifying Pliers Head Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre

Open pliers (1).

Place optical fibre (2) in cutting device (3).

Close pliers (1) and remove optical fibre (2).

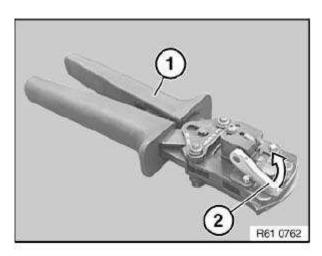


<u>Fig. 97: Identifying Optical Fibre Cutting Device</u> Courtesy of BMW OF NORTH AMERICA, INC.

Stripping insulation from optical fibre

Open pliers (1).

Open lever (2) in direction of arrow.



<u>Fig. 98: Identifying Pliers Lever</u> Courtesy of BMW OF NORTH AMERICA, INC.

Slide optical fibre (1) into stripping device (2) until flush at point (3).

Close pliers (4) fully.

Close clamping lever (5) in direction of arrow.

Open pliers (4) by one tooth notch.

Open clamping lever (5) against direction of arrow again and remove optical fibre (1).

NOTE: A stripping replacement blade set is available under number 61 4 327.

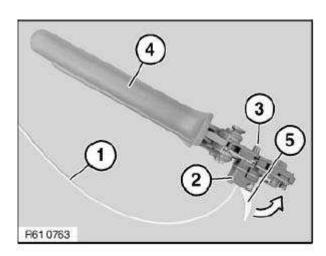


Fig. 99: Identifying Pliers And Clamping Lever Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre to length

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IMPORTANT: The cutting blade must be replaced prior to each cutting of the optical fibre.

Pull pin (1) in direction of arrow.

Fold up blade retaining link (2) in direction of arrow.

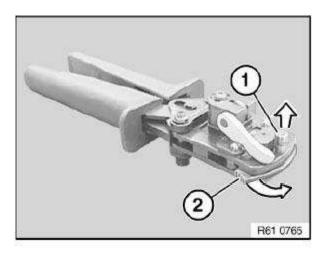


Fig. 100: Pulling Pin Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury when changing the blade.

Remove blade (1) and replace.

Installation:

Make sure blade (1) is correctly seated on locating points (2).

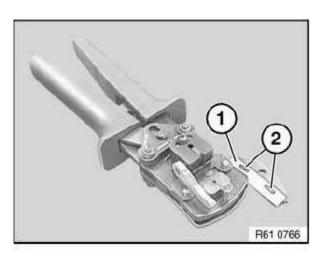


Fig. 101: Identifying Plier Blade Point

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Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (3).

Slide optical fibre (1) into cutting device (2) until insulation of optical fibre (1) butts against clamping device.

Close pliers (3) fully and keep closed.

Remove optical fibre (1).

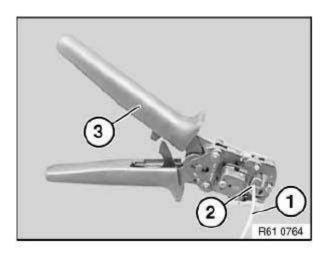


Fig. 102: Identifying Optical Fibre Cutting Device Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... IN-LINE PLUGS, 30-PIN, HYBRID SYSTEM MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the plug housings:

- o MQS (Micro Quadlock System)
- o MPQ, width 2.8 mm (Micro Power Quadlock)
- o MPQ, width 5.2 mm (Micro Power Quadlock)

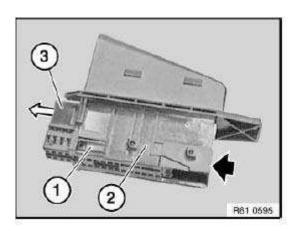
Socket housing:

Raise lock (1) on housing (2).

Push contact carrier (3) from rear out of housing (2).

NOTE: Pushing out the contact carrier releases the secondary locks of the socket contacts.

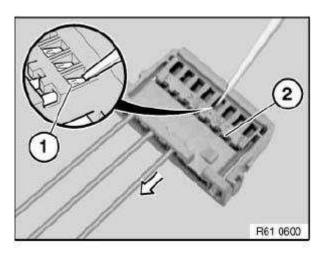
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<u>Fig. 103: Pushing Contact Carrier From Rear Out Of Housing Courtesy of BMW OF NORTH AMERICA, INC.</u>

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

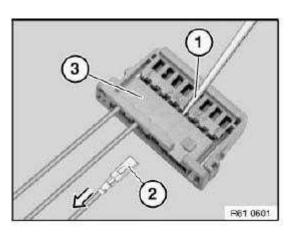
Pull wire with socket contact in direction of arrow as far as secondary lock (2).



<u>Fig. 104: Pulling Wire With Socket Contact</u> Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

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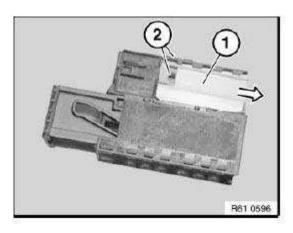
<u>Fig. 105: Pulling Cable With Socket Contact</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pin housing:

Contacts 1 ... 13 and 19 ... 27:

Raise locking slide (1) on both sides (2) of housing and detach.

NOTE: Detaching the locking slide releases the secondary locks of the pin contacts.



<u>Fig. 106: Raising Locking Slide</u> Courtesy of BMW OF NORTH AMERICA, INC.

Contacts 14 ... 18 and 28 ... 30:

Pull slide (1) outwards completely.

Raise lock (2) on housing.

Pull contact carrier (3) out of housing.

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NOTE: Pulling out the contact carrier releases the secondary locks of the pin contacts.

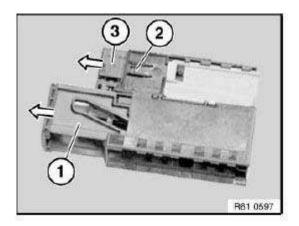


Fig. 107: Pull Slide And Contact Carrier Courtesy of BMW OF NORTH AMERICA, INC.

The pin contacts are pulled out of a contact carrier as described under "Socket housing".

61 13 ... PLUG HOUSING, LCC CONTACT (LOAD CURRENT CONTACT)

Special tools required:

• 61 0 317

Socket housing:

Press lock (1) with suitable tool (2) in direction of arrow out of socket housing (3).

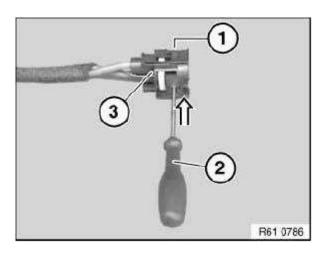


Fig. 108: Pressing Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Pull lock (1) out of socket housing (2).

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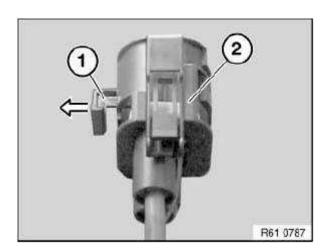


Fig. 109: Pulling Lock Socket Housing Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 61 0 317 into socket housing (1) and pull out lead with LCC contact (2) in direction of arrow.

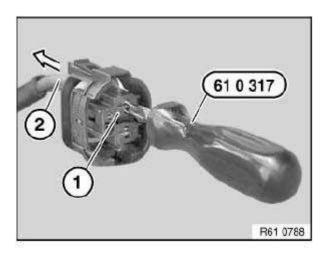


Fig. 110: Identifying Special Tools (61 0 317) Courtesy of BMW OF NORTH AMERICA, INC.

Pin housing:

Unlock locking slide (1) of pin housing (2) with suitable tool (3) in direction of arrow.

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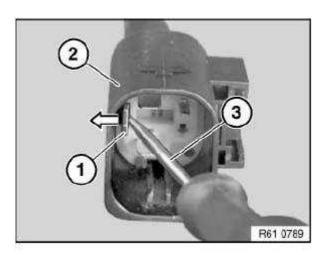


Fig. 111: Unlocking Locking Slide Of Pin Housing Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 61 0 317 into pin housing (1) and pull out lead with LCC contact (2) in direction of arrow.

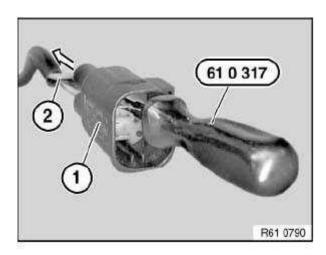
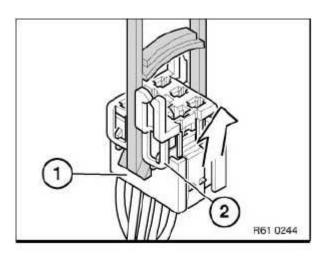


Fig. 112: Identifying Special Tools (61 0 317) Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... RELAY CARRIER

Place special tool 61 1 153 on relay carrier (1) and carefully pull in direction of arrow until retaining lugs (2) on relay carrier are raised.

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<u>Fig. 113: Identifying Relay Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pull relay carrier (2) in direction of arrow into first catch (3).

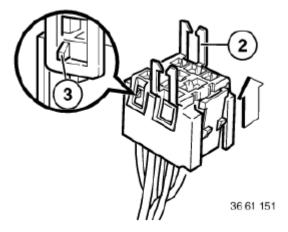
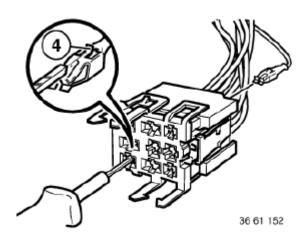


Fig. 114: Pulling Relay Carrier Courtesy of BMW OF NORTH AMERICA, INC.

Press down arrester hook (4) of appropriate contact and pull out cable with contact.

Press out double flat spring contact with special tool 61 1 136 or 61 1 137 (ejector).

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<u>Fig. 115: Identifying Arrester Hook</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... REPAIRING RIBBON CABLES

Special tools required:

• 61 1 190

Place ribbon cables (1) in connector housing (2) and close cover (3).

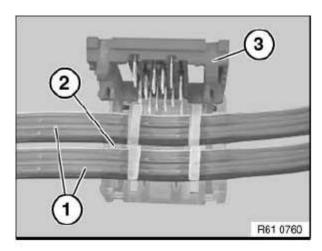


Fig. 116: Identifying Ribbon Cables And Connector Housing Courtesy of BMW OF NORTH AMERICA, INC.

Place connector housing (1) in tool (2) 61 1 190.

Close tool (2).

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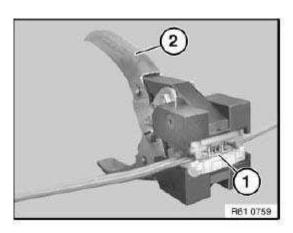


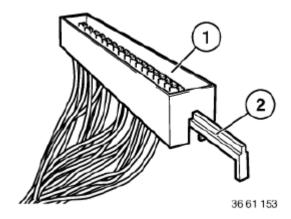
Fig. 117: Identifying Connector Housing Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... RETAINING BRACKET

Pull relevant fuse out of fuse block (1).

NOTE: Mark positions when removing fuses.

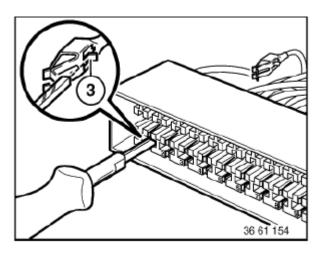
Pull locking slide (2) out of fuse block (1) as far as it will go.



<u>Fig. 118: Identifying Fuse Block And Locking Slide</u> Courtesy of BMW OF NORTH AMERICA, INC.

With special tool 61 1 136 or 61 1 137 (ejector), press back arrester hook (3) of appropriate contact and pull out cable.

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<u>Fig. 119: Pressing Arrester Hook</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... SOCKET HOUSING (RADIO PLUG), HYBRID SYSTEM MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the plug housings:

- o MQS (Micro Quadlock System)
- o MPQ, width 2.8 mm (Micro Power Quadlock)
- o MPQ, width 5.2 mm (Micro Power Quadlock)

Removing MPQ contacts from radio plug:

Press lock (1) in direction of arrow.

Detach secondary lock (2) from radio plug.

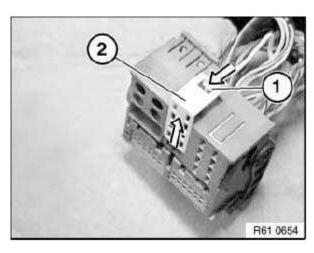


Fig. 120: Pressing Lock
Courtesy of BMW OF NORTH AMERICA, INC.

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Feed special tool 61 1 135 past side of contact.

Press special tool 61 1 135 in direction of arrow.

Pull wire (1) with socket contact out of radio plug (2).

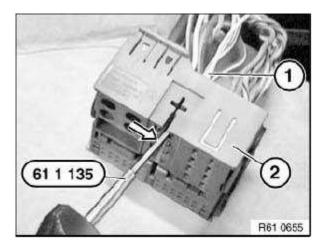


Fig. 121: Identifying Special Tool (61 1 135) Courtesy of BMW OF NORTH AMERICA, INC.

Removing MQS contacts from contact carrier:

Press lock (1) in direction of arrow and pull housing (2) out of radio plug.

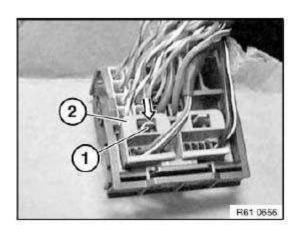
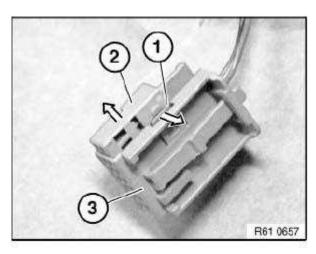


Fig. 122: Pressing Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) in direction of arrow. Pull contact carrier (2) out of housing (3).

NOTE: When the contact carrier is pulled out, the secondary locks of the socket contacts are raised.

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<u>Fig. 123: Pressing Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

NOTE: The illustration shows an 8-pin socket housing where removal of the contacts is identical.

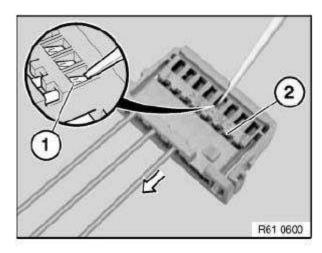


Fig. 124: Pulling Wire With Socket Contact Courtesy of BMW OF NORTH AMERICA, INC.

Hold down arrester hook in secondary lock (1) again. Pull wire with socket contact (2) out of contact carrier (3).

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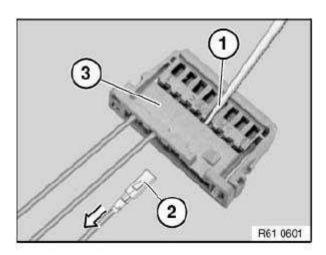


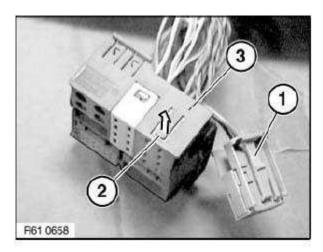
Fig. 125: Pulling Wire With Socket Contact Courtesy of BMW OF NORTH AMERICA, INC.

Removing MPQ contacts from contact carrier:

Remove contact carrier (1) with MQS contacts from radio plug.

Raise lock (2) on radio plug.

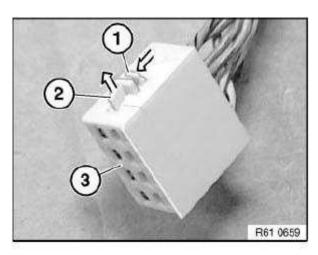
Pull contact carrier (3) out of radio plug.



<u>Fig. 126: Identifying Contact Carrier And Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) in direction of arrow.

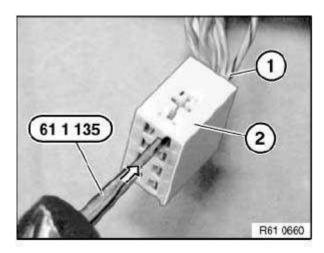
Pull secondary lock (2) in direction of arrow completely out of contact carrier (3).



<u>Fig. 127: Pulling Contact Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 61 1 135 on inside of contact into contact carrier (2).

Pull wire with socket contact (1) out of contact carrier (2).



<u>Fig. 128: Identifying Special Tool (61 1 135)</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... TREATING CABLES AND FIBRE-OPTIC CABLES

Special tools required:

- 61 1 190
- 61 4 320

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

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SPECIAL TOOLS REFERENCE CHART

Repair range for vehicle electrical system	SI 2 04 07 341
Crimping set with tool for fibre-optic cables, Micro Power Quadlock (MPQ), Micro Quadlock System (MQS) contacts and universal crimping head	61 4 320
Insulation displacement tool for ribbon cable	61 1 190

Subject of repair instructions

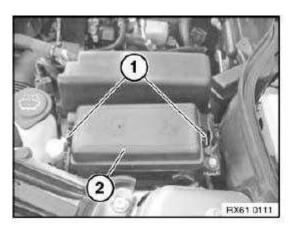
- Refer to **SPECIAL TOOLS FOR WIRING HARNESS REPAIRS**
- Refer to **CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES**.
- Refer to 61 13 CRIMPING STOP PARTS.
- Refer to 61 13 BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION.
- Refer to 61 13 INSTALLING FAN CONNECTOR FOR RETROFITTING/REPAIRS.
- Aerial elbow plug on radio receiver
- Refer to <u>61 13 ... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES</u> TO LENGTH.
- Refer to 61 13 ... CRIMPING OPTICAL FIBRES.
- Insulation displacement connector for 61 13 ... REPAIRING RIBBON CABLES.

61 13 051 REMOVING AND INSTALLING/REPLACING FUSE BOX IN ENGINE COMPARTMENT

Necessary preliminary tasks:

Disconnect battery negative lead

Release retaining clips (1) and remove fuse box cover (2).



<u>Fig. 129: Identifying Retaining Clips And Remove Fuse Box Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove pole shoe, tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM** -

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TIGHTENING TORQUES.

Release screws (2), tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

Raise fuse box.

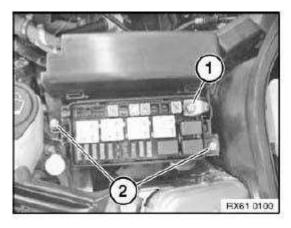


Fig. 130: Identifying Pole Shoe And Screw Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective cap (1).

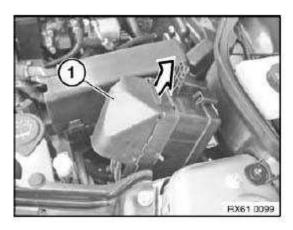


Fig. 131: Removing Protective Cap Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connectors (1) on underside of fuse box.

Replacement:

• Remove fuses and relays

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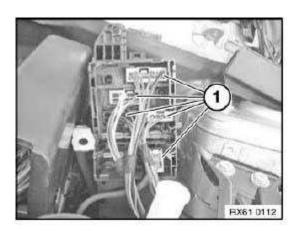


Fig. 132: Identifying Plug Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

20 BATTERY

12 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

Before disconnecting battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

IMPORTANT:

- There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.
- On vehicles with radio code: After disconnecting the battery, the radio code must be re-entered. Therefore obtain the radio code card from the customer beforehand. Note stored stations and restore them after connecting the battery.
- Stored settings of the on-board computer and clock will also be lost.
- All available central keys must be recoded for cars with first generation infrared transmitter locking systems.

General notes on disconnecting battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

Do not under any circumstances pull/lever off pole shoes by force.

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Do not under any circumstances release socket-head cap screw of IBS.

- Detach terminal of battery negative lead from car battery and second battery if fitted. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

After connecting battery:

IMPORTANT: After a power supply interruption some equipment is disabled and must be reactivated.

Likewise, individual settings are lost and must be activated.

Example:

Vehicles with build date from 03/2007:

Teach-in mid-position for power steering

- If necessary, activate sliding sunroof
- If necessary, carry out adjustment of active front steering
- If necessary, activate power windows
- If necessary, activate mirror with compass

Vehicles with a two-battery system

Starter and equipment batteries

A two-battery system has a starter battery circuit and an equipment battery circuit. A secondary control unit monitors both battery circuits. Depending on the situation, the battery circuits are connected to or isolated from the secondary control unit via an isolating relay.

Two AGM batteries are used as a storage battery.

IMPORTANT: These batteries must not under any circumstances be charged with a voltage in excess of 14.8 V. Rapid programs must not be used either.

Receiving/giving starting assistance via jump start terminal

The engine can be jump-started with an external voltage supply via the jump start terminal on the right side of the engine compartment.

NOTE: The starter battery is isolated from the alternators when the engine hood/bonnet is open.

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Giving starting assistance via the jump start terminal is thus limited by the capacity of the starter battery when the engine hood/bonnet is open.

Charging starter and equipment batteries via jump start terminal

The starter battery is charged as a matter of priority with a charger connected to the jump start terminal. The voltage at the starter battery is the decisive factor in determining whether the equipment battery is also included in the charging operation. The secondary control unit automatically detects a charging operation at a charging voltage at the starter battery of > or = 13.5 V. The isolating relay is closed and thus the equipment battery is connected in parallel. Both batteries are now charged.

Prerequisite:

- Terminal 61 inactive
- Terminal 15 inactive

If terminal 15 becomes "active" during the charging operation, the isolating relay is opened immediately and again only the starter battery is charged.

NOTE:

When the engine hood is open, the isolating relay is also opened in normal operation when the engine is running.

A special mode can be set by means of diagnosis for workshop/garage operation. The isolating relay is closed from terminal R in this operating mode. This mode is automatically reset once a distance of 5 km has been driven.

Trickle charging

The increased closed-circuit current consumption can be compensated for via the jump-start connection point with the aid of the "Acctiva easy" battery trickle charger (Service Information 2 03 05 205).

IMPORTANT: The cigarette lighter is isolated from the electrical system after terminal R "OFF" on a timed basis (60 mins.), thereby interrupting charging of the equipment battery via the cigarette lighter. This is prevented if the battery master switch (on the right side of the luggage compartment behind the panel) is turned on and off again twice within 2 seconds. (Cigarette light battery charging function).

12 00 ... INSTRUCTIONS ON STARTING AID

Do not start the engine with help of starting sprays.

Preparation:

Conform with the following when starting engine with starting cable.

o Ensure that jump lead wires are to appropriate cross-section size.

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- Only use fuse-protected jump leads.
- o Check whether the current supplying battery has 12 V voltage.
- o If engine is started from battery of another vehicle, ensure that there is no contact between the bodies of both vehicles

CAUTION: Never touch ignition system components and current - dangerous high tension!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Carrying out:

Always conform with the procedures to avoid injury to persons or damage to parts.

- o On automatic transmission, select "P" setting, apply handbrake.
- o Move the shift lever of vehicles with manual transmission into neutral and apply the parking brake.
- o Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- o First connect positive terminals of both batteries with one jump lead (red).
- o Use positive connection point in engine compartment for vehicles with one battery in trunk.
- o Then attach second jump lead (black) to negative terminal of donor battery and to engine ground or body ground on vehicle to be started.

CAUTION: Never connect second jump lead (black) to negative terminal of battery in vehicle to be started. This would produce explosive gas which could be ignited by sparks.

Danger of explosion!

After engine of vehicle to be started has started up, first disconnect the jump lead on the negative terminal/ground connection. Then remove jump lead from positive terminals.

61 00 ... BATTERY

Battery care and maintenance

In low-maintenance batteries, check the acid level at least once a year. If necessary, top up with distilled water up to the top marking.

The increasing number of electronic control units in the car reduces the self-discharging time of the battery (even in standby mode). To maintain the battery service life and to avoid exhaustive discharging, recharge laid-up vehicles every 6 weeks at the latest. The time for self-discharging depends on vehicle type and equipment specification.

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Battery test

The battery acid density can be used to measure the charge state. However this test produces uncertainty caused by a design-related range of variation. The acid density e.g. for a charged battery is 1.28 kg/l (in the tropical version the acid density is 1.23 kg/l).

Another interference factor is the acid lamination immediately after filling with distilled water.

Battery wear with partially sulphated and/or heavily contaminated plates will also lead to incorrect acid density test results.

61 00 ... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations:

Safety regulations for handling components of airbag system. Refer to **MULTIPLE RESTRAINT SYSTEM - OVERVIEW** .

Instructions for disconnecting and connecting battery. Refer to <u>61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY</u>.

Procedure for cable repair

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colors. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Refer to 61 13 CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES.

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Repair plug connection using connectors.

Refer to 13 PLUG CONNECTION, TERMINALS.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Refer to 61 13 CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES.

Repair plug connection using connectors.

Refer to 13 PLUG CONNECTION, TERMINALS.

61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY

Battery acid is highly corrosive:

Do not allow any battery acid to come into contact with the eyes, the skin or clothing. Therefore wear protective clothing, gloves and goggles.

Do not tilt the battery, acid may emerge from the vent opening.

In event of contact with acid:

If acid is splashed into the eyes, rinse them immediately for several minutes with clear water. You must then consult a doctor without delay.

If acid is splashed onto the skin or clothing, neutralize it immediately with a soapy solution and rinse with lots of water

Seek medical attention immediately if battery acid is accidentally swallowed.

Explosion hazard:

Strictly no flames, sparks, naked light or smoking!

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A highly explosive mixture of electrolytic gas is created when batteries are charged. The rooms where charging is carried out must therefore always be well ventilated.

Avoid the formation of sparks when handling cables, wiring and electrical devices.

Turn the ignition lock to the 0 position before disconnecting or connecting the battery.

Do not place tools or any similar object on the battery (danger of short-circuiting and explosion!).

61 12 ... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: Do not connect continuous trickle charger to the cigarette lighter.

The cigarette lighter is powered by the rear distribution box via a relay. This relay drops out after terminal 15 OFF. This means that a continuous trickle charger connected to the cigarette lighter is disconnected from the battery.

Charge the battery via the jump-start connection points. Only then can the power supply be registered by the vehicle

WARNING: Danger of destruction in event of mechanical strain

- o Do not introduce any additional connections at the battery negative terminal.
- Do not modify the grounding cable.

The grounding cable also serves to dissipate heat.

- Do not establish any connection between the IBS and the sensor screw.
- o Do not use force when disconnecting the pole shoe from the battery terminal:
 - Do not pull on the grounding cable.
 - Do not place any tools under the IBS to lever off the pole shoe.
- Do not use IBS connections as levers.
- Use a torque wrench and set tightening torque in accordance with repair instructions.
- o Do not release or tighten down sensor screw (screw with Torx head).
- o Avoid contact between IBS and ground.

WARNING: Danger of destruction to IBS and cables when battery is replaced

o The IBS and the cables can be destroyed by mechanical strain when the battery is replaced.

Therefore avoid mechanical strain.

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- o The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- o Use the battery size (capacity) installed as standard when replacing the battery.
- o Register battery change via Service Function (Progman or DIS).
- o Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.
- o Always proceed in accordance with the repair instructions.

NOTE: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- o A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- o For this reason, only replace the IBS when a corresponding fault is entered in the DME or DDE.

61 20 ... THRESHOLD VALUES FOR BATTERY INSPECTION OF ALL BATTERY (TELEPHONE EXCEPT FOR TELEPHONE BATTERY)

Refer to 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

Test step 1 - before charging the battery

BATTERY REFERENCE CHART

Charge state (1)	Starting capability (2)	Test result
Not testable		Charge
less than 50 % (2)		Charge
more than 50 %	less than 75 %	Charge
more than 50 %	more than 75 % (3)	Charge
more than 80 %	more than 75 %	O.K.

- (1) Charge condition and starting power must always be evaluated together
- (2) When test charging for more than 5 hours, use charger Gossen CG 32 or Siemens / Gossen VB 801
- (3) Fully charge until charge state is more than 80 %.

Test step 2 - after charging the battery

BATTERY REFERENCE CHART

Charge condition (1)	Starting capability (2)	Test result
Not testable		Defective
less than 50 %	less than 75 %	Charge
more than 50 %	more than 75 %	Charge

- (1) Charge condition and starting power must always be evaluated together
- (2) When test charging for more than 5 hours, use charger Gossen CG 32 or Siemens / Gossen VB 801

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NOTE: If battery was checked on the positive terminal in the engine compartment, repeat check directly on battery for sake of safety.

61 20 ... AGM BATTERY



Fig. 133: Identifying AGM Battery
Courtesy of BMW OF NORTH AMERICA, INC.

Introduction

In September 2002 so-called VRLA batteries, better known as **AGM batteries**, were introduced.

(VRLA stands for V alve R egulated L ead A cid, i.e. lead acid battery with pressure relief valve; AGM stands for A bsorbent G lass Mat, i.e. absorbent glass fibre fleece)

AGM batteries are fitted in models with electrical loads/consumers which have a high energy demand.

With the option SA 146 (2nd battery), the AGM battery (70 Ah) is fitted as the 2nd battery.

The constantly increasing energy demand of modern vehicle electrical systems calls for ever more powerful battery solutions. Today, up to 100 servomotors, which have to be electrically powered, operate in a modern luxury-class motor vehicle. Added to these are safety, environmental and comfort and convenience elements which are increasingly becoming standard features, such as e.g. Anti-lock Brake System (ABS), Dynamic Stability Control (DSC), electric steering effort assistance (EPS), heated catalytic converter, electronic chassis and suspension control, air conditioning and navigation system.

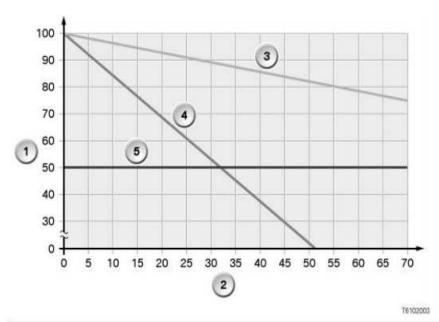
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The power consumption is considerable even when the vehicle is parked.

The somewhat higher price compared with a battery of similar size is fully balanced by the following benefits:

- o Significantly longer service life
- o Increased starting reliability at low temperatures
- o Safe starting of engines with high starting current demands, e.g. high-performance diesel engines
- o 100 % freedom from maintenance
- o Low risk in event of an accident (reduced risk to the environment)

Service life of AGM battery



Key	Explanation	Key	Explanation
1	Available capacity [%]	2	Kilometres covered [1000 km]
3	AGM battery	4	Lead calcium battery
5	50 % capacity limit	17 60	- 22.7

<u>Fig. 134: AGM Battery Graph</u> Courtesy of BMW OF NORTH AMERICA, INC.

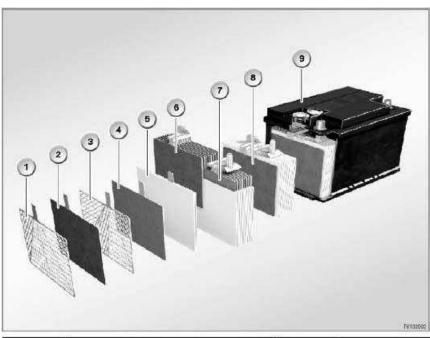
Unlike the previously used lead calcium batteries, the sulphuric acid contained in batteries with fleece technology is not self-contained in the battery housing.

Instead, the sulphuric acid is 100 % bound up in glass fibre fleece mats (separators). Thus, no acid can escape if the battery housing is damaged. In addition, the AGM battery is sealed gas-tight. This is possible because the gases are converted back into water as a result of the separator permeability.

Brief description of components

An AGM battery can be recognized by its black housing and the lack of a so-called "Magic Eye"

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Key	Explanation	Key	Explanation	
1	Positive grid with silver alloy	2	Positive plate	
3	Negative grid	4	Negative plate	
5	Separator made of glass fibre fleece	6	Positive plate pack	
7	Negative plate pack	8	Plate block	
9	Block holder with bottom rails	6.60		

Fig. 135: Identifying AGM Battery Components Courtesy of BMW OF NORTH AMERICA, INC.

Design

The AGM battery differs from the conventional lead calcium battery as follows:

Larger plates:

Larger plates provide for a 25 % higher power density.

o Separators made of glass fibre fleece:

These provide for up to 3 times higher cycle reliability.

This in turn improves cold starting performance, current consumption and service life.

o Gas-tight housing with pressure relief valve (see also **MODE OF OPERATION**):

The cell plugs are welded and cannot be opened.

o Acid bound up in the glass fibre fleece:

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The acid is not as previously self-contained in the housing, but 100 % bound up in the glass fibre fleece. This provides increased protection against acid leakage and thus represents a reduced risk to the environment.

Mode of operation

The AGM battery differs from conventional batteries in its non-polluting and substance-retaining behavior during charging.

When vehicle batteries are charged, the two gases oxygen and hydrogen are released by electrolysis.

- o In a conventional wet lead calcium battery, the two gases hydrogen and oxygen are dissipated into the atmosphere.
- o In an AGM battery, the two gases are converted back into water: The oxygen which is created at the positive electrode during charging passes through the permeable glass fibre fleece to the negative electrode. At the negative electrode the oxygen reacts with the arriving hydrogen ions in the electrolyte to form water (oxygen cycle).

In this way, the gas and thus also the electrolyte are not lost.

Only in the event of an excessively heavy buildup of gas, i.e. excessively high pressure buildup (20 to 200 mbar), does the pressure relief valve discharge the gas. In this process, the pressure relief valve does not allow any oxygen in the air to enter. Because a valve regulates the pressure in the battery, the AGM battery is also known as a VRLA battery (Valve Regulated Lead Acid).

Notes and instructions for service personnel

It is necessary when handling an AGM battery to observe some particular points pertaining to battery changing and installation location.

Charging

WARNING: Do not charge the AGM battery with > or = 15.2 V. No quick-charging routines!

When charging removed batteries (so-called stand-alone batteries), do not exceed the maximum charging voltage of 15.2 V at room temperature. Also when charging via the jump start terminal, do not exceed the maximum charging voltage of 15.2 V at room temperature.

The AGM battery will be damaged even when it is only briefly charged with a charging voltage of more than 15.2 V. A charging voltage of more than 15.2 V is usually used in quick-charging routines.

Installation location

WARNING: Do not install the AGM battery in the engine compartment.

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The AGM battery must not be installed in the engine compartment on account of the high spatial temperature differences, otherwise its service life will be significantly shortened.

Housing

WARNING: Do not open the AGM battery.

The AGM battery must not be opened under any circumstances as the introduction of oxygen from the air will cause the battery to lose its chemical equilibrium and be rendered non-operational.

Battery changing

Any conventional lead calcium battery can always be replaced by an AGM battery.

Using an AGM battery does not require any alterations to be made to the vehicle electrical system.

NOTE: The AGM battery is recommended for "problem customers".

"Problem customers" encounter a high energy throughput through their batteries. This high energy throughput is caused by stationary loads/consumers (TV, independent heating, etc.) and a bad use profile for the battery ("chauffeur operation", short-distance driving, "stop-and-go"). The use of an AGM battery is recommended for these problem customers.

61 20 ... BATTERY CHARGING

If a normal or quick charger is used to charge the battery, the battery must be disconnected from the vehicle electrical system and removed. This prevents damage to paintwork and upholstery.

Ideally, battery charging is performed with BMW-approved charging computers.

IMPORTANT: In order to prevent the intelligent battery sensor from malfunctioning, the charging terminals in the engine compartment must be used without fail in vehicles from E60 and should be used if possible in other vehicles.

IMPORTANT: Before charging the battery while it is installed, first carry out a closed-circuit current test. If here the voltage is 10 V or less, one or more of the cells may be faulty or the entire battery may already be damaged. In this case, always remove the battery as escaping gases during charging could damage the interior equipment and trim. Attempt to regenerate faulty cells with low charging current.

If necessary, open existing plugs on the individual cells.

61 20 ... BATTERY OPEN-CIRCUIT CURRENT TEST

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NOTE: Observe 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.



W05 95 001

Fig. 136: Identifying Battery Open-Circuit Current Test Courtesy of BMW OF NORTH AMERICA, INC.

The open-circuit current test is performed using the Diagnosis and Information System (DIS).

61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD

WARNING: Follow safety regulations for handling vehicle battery.

Follow instructions for 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING

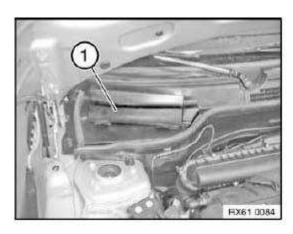
VEHICLE BATTERY.

Follow instructions on 61 12 ... GENERAL INFORMATION ON

INTELLIGENT BATTERY SENSOR (IBS).

Open cover (1).

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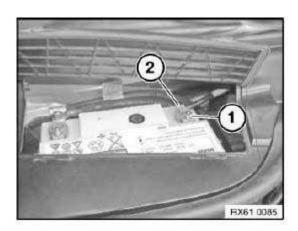
<u>Fig. 137: Identifying Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Version without intelligent battery sensor (IBS):

Loosen nut (1).

Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

Disconnect battery negative lead (2) and secure at side.



<u>Fig. 138: Identifying Battery Lead And Nut</u> Courtesy of BMW OF NORTH AMERICA, INC.

Version with intelligent battery sensor (IBS):

Loosen nut (1).

Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

Disconnect battery negative lead (2) and secure at side.

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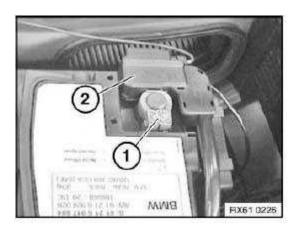


Fig. 139: Identifying Battery Lead And Nut Courtesy of BMW OF NORTH AMERICA, INC.

61 20 908 PERFORMING BATTERY "POWER RESET" (FOR PROGRAMMING/CODING CONTROL UNIT(S))

IMPORTANT: Observe 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

The following steps must be carried out for a "power reset":

- Switch off and disconnect battery charger
- Switch off ignition

Cars with ignition key: Turn ignition key to 0 position

Cars with identification sensor: Remove identification sensor from slot

Cars with comfort access system: Make sure terminal is in 0 position

- Disconnect battery negative terminal
- Reconnect battery negative terminal (to ensure bus activity)
- Waiting time (5-10 seconds)
- Disconnect battery negative terminal
- Waiting time (1 minute)
- Connect battery negative terminal and tighten. Refer to <u>GENERAL ELECTRICAL SYSTEM TIGHTENING TORQUES</u>.
- Connect and switch on battery charger
- Switch ignition on

21 BATTERY-VAPOUR SEPARATE

61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD

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WARNING: Follow safety regulations for handling vehicle battery.

Follow instructions for 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING

VEHICLE BATTERY.

Follow instructions on 61 12 ... GENERAL INFORMATION ON

INTELLIGENT BATTERY SENSOR (IBS).

Open cover (1).

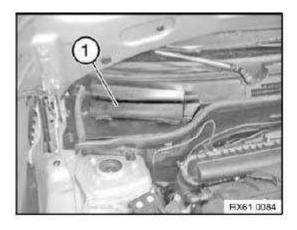


Fig. 140: Identifying Cover Courtesy of BMW OF NORTH AMERICA, INC.

Version without intelligent battery sensor (IBS):

Loosen nut (1).

Tightening torque. Refer to <u>GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES</u>.

Disconnect battery negative lead (2) and secure at side.

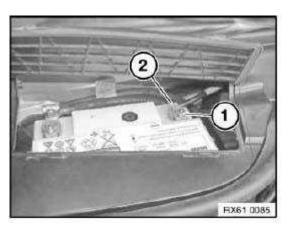


Fig. 141: Identifying Battery Lead And Nut Courtesy of BMW OF NORTH AMERICA, INC.

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Version with intelligent battery sensor (IBS):

Loosen nut (1).

Tightening torque. Refer to GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES.

Disconnect battery negative lead (2) and secure at side.

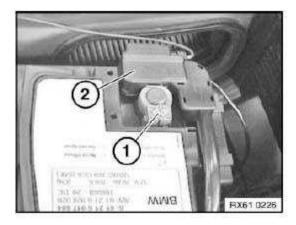


Fig. 142: Identifying Battery Lead And Nut Courtesy of BMW OF NORTH AMERICA, INC.

61 20 908 PERFORMING BATTERY "POWER RESET" (FOR PROGRAMMING/CODING CONTROL UNIT(S))

IMPORTANT: Observe 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY.

The following steps must be carried out for a "power reset":

- Switch off and disconnect battery charger
- Switch off ignition

Cars with ignition key: Turn ignition key to 0 position

Cars with identification sensor: Remove identification sensor from slot

Cars with comfort access system: Make sure terminal is in 0 position

- Disconnect battery negative terminal
- Reconnect battery negative terminal (to ensure bus activity)
- Waiting time (5-10 seconds)
- Disconnect battery negative terminal
- Waiting time (1 minute)
- Connect battery negative terminal and tighten. Refer to **GENERAL ELECTRICAL SYSTEM** -

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TIGHTENING TORQUES.

- Connect and switch on battery charger
- Switch ignition on

61 21 010 REMOVING AND INSTALLING OR REPLACING BATTERY

WARNING: Follow safety regulations for handling vehicle battery.

Follow instructions for 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING

VEHICLE BATTERY.

Follow instructions on 61 12 ... GENERAL INFORMATION ON

INTELLIGENT BATTERY SENSOR (IBS).

Necessary preliminary tasks:

• Remove right cowl panel cover

Loosen nut (1). Tightening torque. Refer to <u>GENERAL ELECTRICAL SYSTEM - TIGHTENING</u> <u>TORQUES</u>.

Disconnect battery negative lead (2) and secure at side.

Loosen nut (3). Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

Remove battery positive lead (4).

Detach vent hose (5).

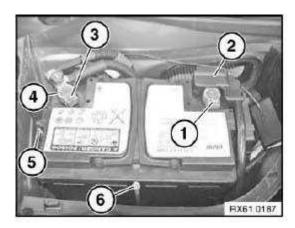
Release screw (6) and remove with holder. Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM** - **TIGHTENING TORQUES** .

Lift out battery.

Installation:

• Make sure battery is correctly seated in associated fixture.

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<u>Fig. 143: Identifying Battery Lead Holder And Nut</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacing version with intelligent battery sensor (IBS):

- Read out fault memory, clear if necessary
- Register battery replacement

30 SWITCHES, HORN, SMALL

61 30 020 REMOVING AND INSTALLING/REPLACING SWITCH BLOCK

Necessary preliminary tasks:

• Remove storage compartment

Release screws (1).

Remove switch block (2).

Installation:

Switch block (2) must be correctly seated in guide pins (3).

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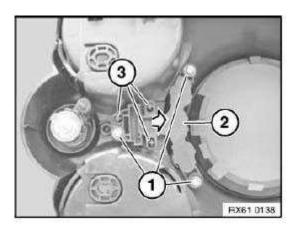


Fig. 144: Removing Switch Block And Screw Courtesy of BMW OF NORTH AMERICA, INC.

31 SWITCH

61 30 020 REMOVING AND INSTALLING/REPLACING SWITCH BLOCK

Necessary preliminary tasks:

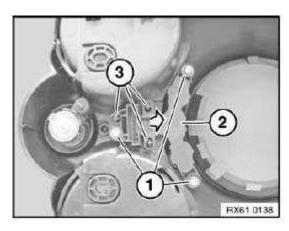
• Remove storage compartment

Release screws (1).

Remove switch block (2).

Installation:

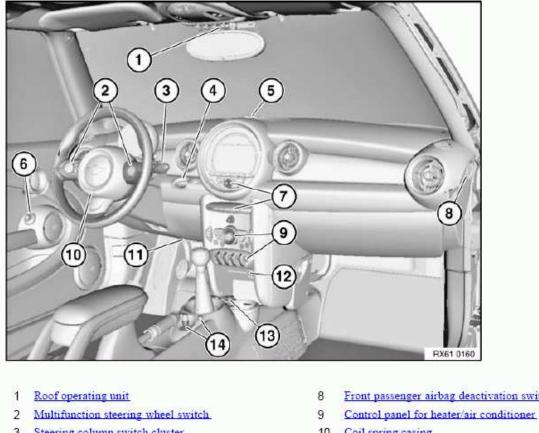
Switch block (2) must be correctly seated in guide pins (3).



<u>Fig. 145: Removing Switch Block And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

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61 31 .. OVERVIEW OF SWITCHES



- 3 Steering column switch cluster
- 4 Insert for radio control key
- 5 Switch for hazard warning lights
- 6 Door mirror switch
- 7 Radio receiver

- Front passenger airbag deactivation switch
- 10 Coil spring casing
- 11 Clutch switch module / brake light switch
- 12 AV connection socket
- 13 Switch block
- 14 Controller, front

Fig. 146: Identifying Switches Components

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 008 REMOVING AND INSTALLING/REPLACING STEERING COLUMN SWITCH CLUSTER

WARNING: Move wheels into straight-ahead position and do not alter this position during the repair work.

With steering wheel removed, do not under any circumstances turn/twist fixture for steering column stalk!

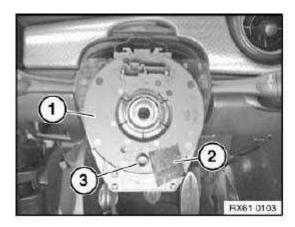
Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove sport steering wheel
- Remove lower section of steering column trim

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WARNING: Secure volute spring cassette (1) against rotating with adhesive tape (2). If unauthorized rotation of volute spring cassette (1) cannot be ruled out, it is essential to return volute spring cassette (1) to center position!

- Turn volute spring counterclockwise as far as it will go.
- Turn volute spring clockwise as far as it will go.
- Turn volute spring back to center position and secure so that centering pin (3) is at bottom position.



<u>Fig. 147: Identifying Volute Spring Cassette</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

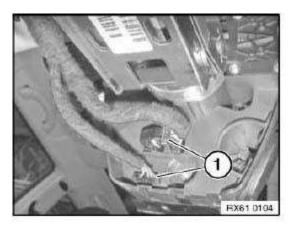


Fig. 148: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

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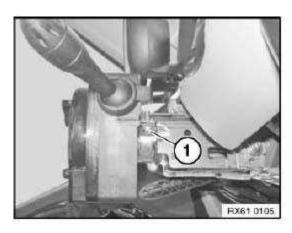


Fig. 149: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Unlock retaining tab (1) and retaining tab on opposite side in outward direction.

Pull off steering column switch cluster (2) in direction of arrow.

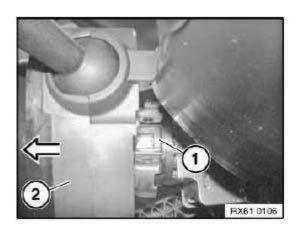


Fig. 150: Pulling Off Steering Column Switch Cluster Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining tabs (1) must not be damaged

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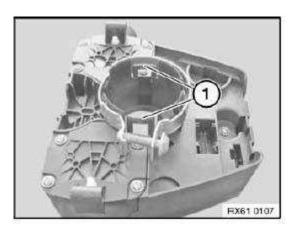


Fig. 151: Identifying Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove volute spring cassette
- Carry out programming/coding

61 31 011 REMOVING AND INSTALLING/REPLACING VOLUTE SPRING CASSETTE

Necessary preliminary tasks:

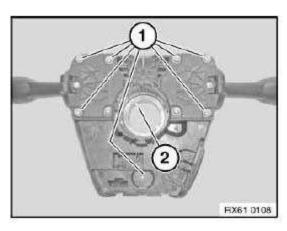
• Remove steering column switch cluster

Release screws (1).

NOTE:

Mark installation position of inner ring of volute spring to steering column switch cluster.

When replacing, carry over marking (2) to new part.



<u>Fig. 152: Identifying Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Expand catches (1) and remove volute spring cassette (2) from steering column switch cluster (3).

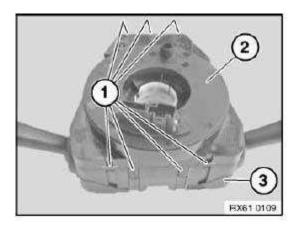


Fig. 153: Identifying Catches And Volute Spring Cassette Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Guide pins (1) of volute spring must be correctly engaged in locators (2) for steering column switch cluster.

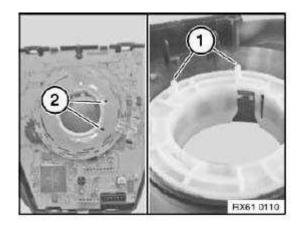


Fig. 154: Identifying Guide Pins Of Volute Spring Courtesy of BMW OF NORTH AMERICA, INC.

61 31 029 REMOVING AND INSTALLING/REPLACING ROOF OPERATING UNIT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

Lever trim (1) off roof operating unit.

If necessary, disconnect microphone plug connection and remove trim (1).

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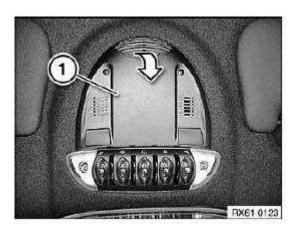


Fig. 155: Removing Trim Off Roof Operating Unit Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Unlock catches (2).

Lower roof operating unit (3).

Disconnect associated plug connections and remove roof operating unit (3).

Replacement:

If necessary, remove bulbs.

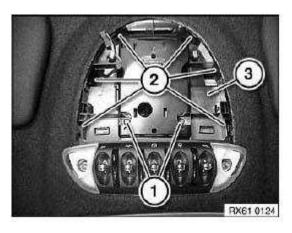


Fig. 156: Identifying Catches And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

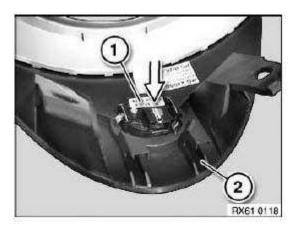
61 31 080 REMOVING AND INSTALLING/REPLACING SWITCH FROM HAZARD WARNING LIGHTS

Necessary preliminary tasks:

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• Remove cover for instruments

Press switch for hazard warning lights (1) in direction of arrow out of cover for instruments (2).



<u>Fig. 157: Pressing Switch For Hazard Warning Lights</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 31 113 REMOVING AND INSTALLING/REPLACING BOTH SHIFT PADDLES FOR AUTOMATIC TRANSMISSION

Necessary preliminary tasks:

• Remove airbag unit

Disconnect plug connection (1).

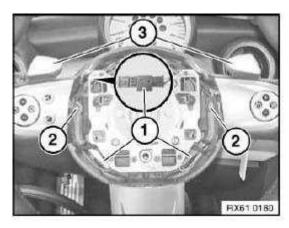
Release screws (2).

Remove shift paddles (3).

Installation:

- Make sure shift paddles (3) are correctly seated
- Make sure electrical leads are correctly routed

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<u>Fig. 158: Identifying Shift Paddles And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 31 133 REMOVING AND INSTALLING/REPLACING AV CONNECTION SOCKET

Special tools required:

• 00 9 340

Press out AV connection socket (1) with special tool 00 9 340.

Disconnect plug connection.



Fig. 159: Identifying Special Tool (00 9 340) Courtesy of BMW OF NORTH AMERICA, INC.

61 31 195 REMOVING AND INSTALLING (REPLACING) FRONT CONTROLLER

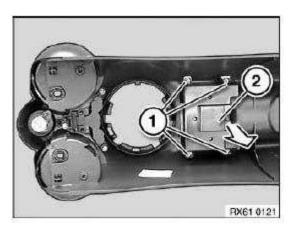
Necessary preliminary tasks:

• Remove storage compartment

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Release screws (1).

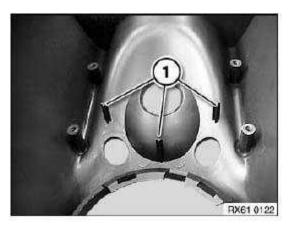
Remove controller (2).



<u>Fig. 160: Removing Controller And Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Controller must be correctly seated in guide pins (2).



<u>Fig. 161: Identifying Guide Pins</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 31 220 REMOVING AND INSTALLING/REPLACING MULTIFUNCTION STEERING WHEEL SWITCH

Necessary preliminary tasks:

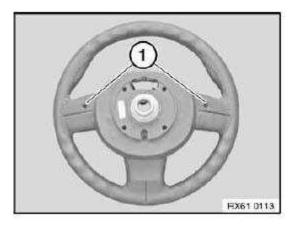
• Remove shift paddles

NOTE: Illustration shows steering wheel removed.

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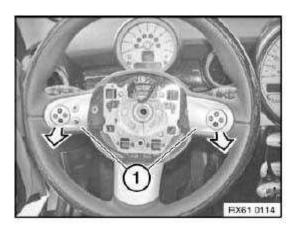
The two multifunction steering wheel switches can be removed independently of each other.

Release screws (1).



<u>Fig. 162: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove switches (1) in direction of arrow.

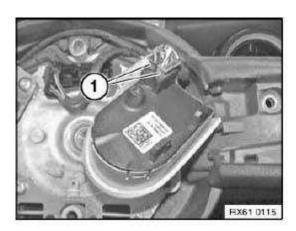


<u>Fig. 163: Removing Switches</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustrations depict removal of the right multifunction steering wheel switch. The left multifunction steering wheel switch is removed in the same way.

Disconnect plug connections (1) and remove multifunction steering wheel switches.

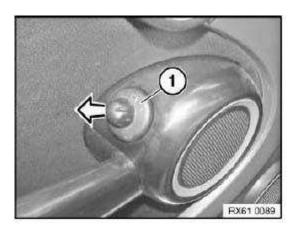
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<u>Fig. 164: Identifying Plug Connections</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 31 255 REPLACING SWITCH FOR DOOR MIRROR

Unclip switch for door mirror (1).



<u>Fig. 165: Unclipping Switch For Door Mirror</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Remove switch for door mirror (2).

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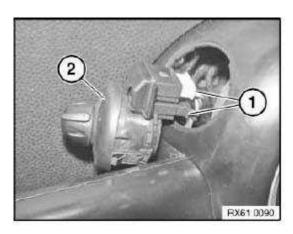


Fig. 166: Identifying Plug Connection And Switch Courtesy of BMW OF NORTH AMERICA, INC.

61 31 270 REMOVING AND INSTALLING/REPLACING REVERSING LIGHT SWITCH

Necessary preliminary tasks:

• Remove air cleaner box

Disconnect plug connection (1).

Remove reversing light switch (2).

Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

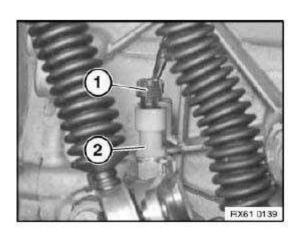


Fig. 167: Identifying Plug Connection And Reversing Light Switch Courtesy of BMW OF NORTH AMERICA, INC.

61 31 299 REMOVING AND INSTALLING/REPLACING CLUTCH SWITCH MODULE

Necessary preliminary tasks:

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• Remove trim for instrument panel at bottom left

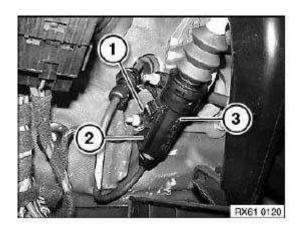
Disconnect plug connection (1).

Lever out clutch switch module (2) from clutch master cylinder (3) with screwdriver.

Installation:

Clutch switch module is secured against incorrect installation.

Clutch switch module must snap audibly into place.



<u>Fig. 168: Identifying Clutch Switch Module</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 31 310 REPLACING BRAKE LIGHT SWITCH

Necessary preliminary tasks:

• Remove lower trim from instrument panel

NOTE: Brake light switch (2) is situated above the brake pedal.

Disconnect plug connection (1).

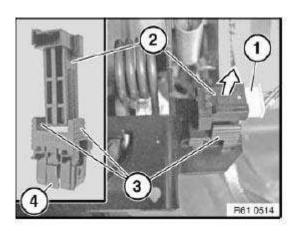
Pull brake light switch (2) in direction of arrow out of brake light switch holder (3).

Press catches (4) together and unclip brake light switch holder (3) from brake pedal.

Installation:

Depress brake pedal.

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<u>Fig. 169: Identifying Brake Light Switch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Slide brake light switch (2) as far as it will go into brake light switch holder (3).

Grip brake light switch holder (3), slowly return brake pedal to starting position and pull back to stop.

61 31 492 REPLACING LEVEL SWITCH FOR WINDSCREEN WASHER SYSTEM

NOTE: Drain fluid reservoir for windscreen washer system.

Necessary preliminary tasks:

• Remove front left wheel arch trim

Disconnect plug connection (1).

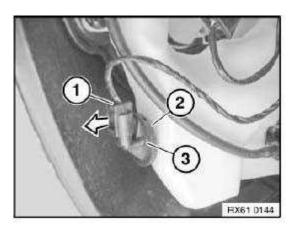
Pull level switch for windscreen washer system (3) in direction of arrow out of fluid reservoir for windscreen washer system.

Installation:

Grommet (2) must not be damaged.

First install grommet (2) in fluid reservoir for windscreen washer system (3).

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<u>Fig. 170: Pulling Level Switch For Windscreen Washer System</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT

NOTE: Steering angle sensor adjustment must be carried out:

- after adjustment work on the front axle/steering
- after all mechanical work on the steering system
- after replacement / coding / programming of the following components:
 - Steering column switch cluster
 - Dynamic Stability Control (DSC) control unit

Connect vehicle to BMW diagnosis system.

Select and carry out steering angle sensor adjustment under Service functions.

61 34 ... REMOVING AND INSTALLING/REPLACING POWER SOCKET IN STORAGE COMPARTMENT

Necessary preliminary tasks:

• Remove storage compartment

Carefully lever bulb holder (1) in direction of arrow off power socket (2).

Press power socket (2) out of trim (3).

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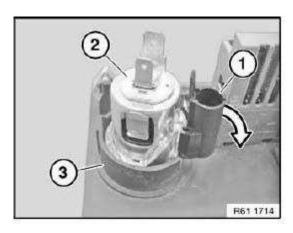


Fig. 171: Identifying Power Socket And Bulb Holder Courtesy of BMW OF NORTH AMERICA, INC.

33 HORN

61 33 060 REMOVING AND INSTALLING/REPLACING BOTH FANFARE HORNS

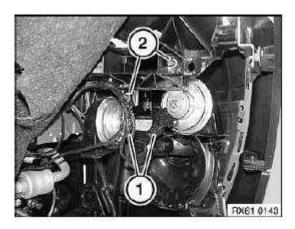
Necessary preliminary tasks:

• Remove front right wheel arch trim

Disconnect plug connection (1).

Release screws (2), tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

Remove fanfare horns.



<u>Fig. 172: Identifying Fanfare Horns</u> Courtesy of BMW OF NORTH AMERICA, INC.

34 INSERT HOLDER FOR CIGARETTE LIGHTER

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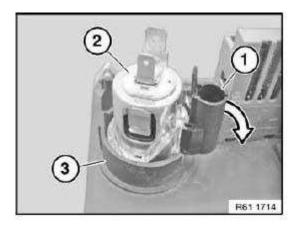
61 34 ... REMOVING AND INSTALLING/REPLACING POWER SOCKET IN STORAGE COMPARTMENT

Necessary preliminary tasks:

• Remove storage compartment

Carefully lever bulb holder (1) in direction of arrow off power socket (2).

Press power socket (2) out of trim (3).



<u>Fig. 173: Identifying Power Socket And Bulb Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

35 ECUS, MODULES

61 35 .. OVERVIEW OF CONTROL UNITS

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Fig. 174: Identifying Control Units Components Courtesy of BMW OF NORTH AMERICA, INC.

61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE)

Special tools required:

• 12 7 060

NOTE:

Electrical components which are particularly sensitive to electrostatic discharge (electronic control units, sensors, etc.) are marked with the ESD warning symbol.

- E -Electro
- S -Static
- **D** -Discharge

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IMPORTANT: Read and comply without fail with the notes on this subject from appropriate Service Information.

Statically charged persons can discharge by touching electrical components.

NOTE: Humans can only detect a discharge starting from a level of approx. 3000 V.

The danger threshold for electrical components already starts from a level of

approx. 100 V.

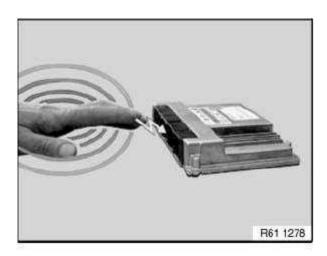


Fig. 175: Touching Electrical Components
Courtesy of BMW OF NORTH AMERICA, INC.

Example:

Mechatronic control unit.

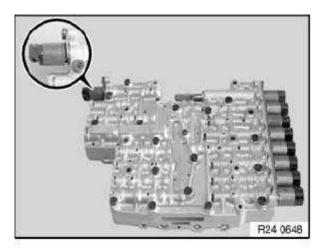


Fig. 176: Identifying Mechatronic Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

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<u>Fig. 177: Precaution For - Do Not Touch Pins Or Multi-Pin Connectors Directly</u> Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not touch pins or multi-pin connectors directly!

Touch electrical components by their housings only.

IMPORTANT: To prevent electrical components from being damaged or destroyed by electrostatic discharge, it is absolutely essential to comply with the following instructions:

- When replacing electrical components, leave the replacement components in their original packaging until immediately before they are to be installed
- If necessary, always return a removed component in its original packaging (always pack the component away immediately)
- Read and comply with user information on using the associated special tool 12 7 060

61 35 015 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR CAR ACCESS SYSTEM

NOTE: The comfort access system is a radio-based system and can be interfered with

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by radio waves from other systems (e.g. mobile phone).

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove instrument panel top section trim

Release screw (1).

Disconnect plug connections (2) and remove control unit for Car Access System.

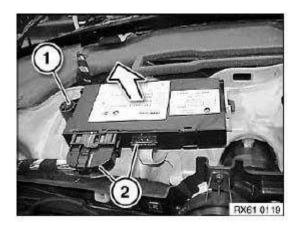


Fig. 178: Removing Control Unit For Car Access System Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out programming/coding.

61 35 040 REMOVING AND INSTALLING/REPLACING FUSE BOX (SPEG)

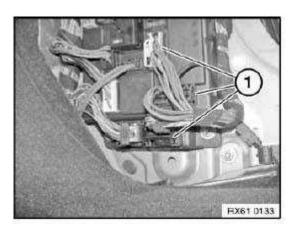
Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove battery negative lead

Disconnect plug connection (1).

NOTE: Write down color and position of plug connectors before removing.

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<u>Fig. 179: Identifying Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

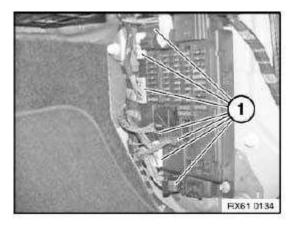


Fig. 180: Identifying Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Clip battery positive lead out of holder (1).

Detach battery positive lead from fuse box (2).

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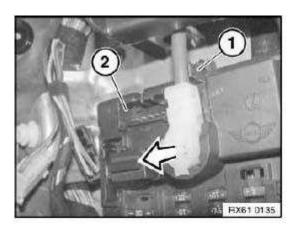


Fig. 181: Detaching Battery Lead From Fuse Box Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Remove fuse box (2).

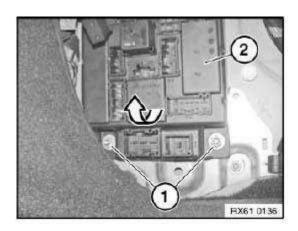


Fig. 182: Removing Fuse Box Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure pin (1) is correctly seated in guide (2).

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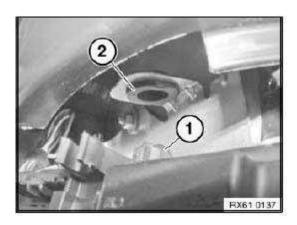


Fig. 183: Identifying Guide Seat Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove fuses and relays
- Carry out programming/coding

61 35 070 REMOVING AND INSTALLING/REPLACING MODULE FOR FOLDING DOOR MIRROR

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection) .

Necessary preliminary tasks:

• Remove rear left side trim panel

Unscrew nuts (1).

Disconnect plug connection (2) and remove control unit for folding door mirror.

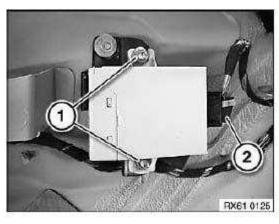


Fig. 184: Identifying Plug Connection And Nuts

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Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

61 35 095 REMOVING AND INSTALLING/REPLACING SEAT MODULE FOR SEAT HEATING

NOTE: Move seat completely towards rear/top.

Disconnect plug connection (1).

Open lock (2) and remove seat module (3) in direction of arrow.

Installation:

Make sure seat module (3) is correctly engaged in lock (2).

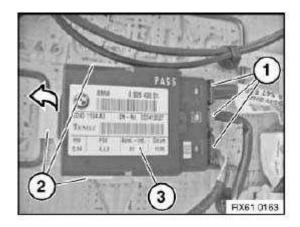


Fig. 185: Removing Seat Module Courtesy of BMW OF NORTH AMERICA, INC.

61 35 115 REMOVING AND INSTALLING/REPLACING FOOTWELL MODULE

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

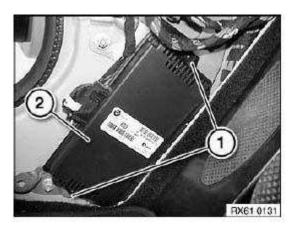
Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove front left entrance cover strip

Unscrew nuts (1).

Pull back footwell module (2) slightly.

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<u>Fig. 186: Identifying Footwell Module And Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) and remove footwell module (2).

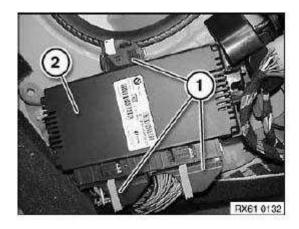


Fig. 187: Identifying Footwell Module Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

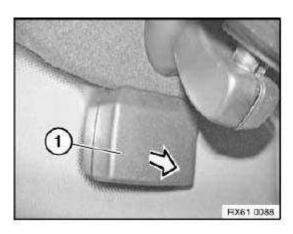
Carry out programming/coding.

61 35 177 REMOVING AND INSTALLING/REPLACING RAIN/LIGHT SENSOR

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection) .

Unclip cover (1) in direction of arrow and remove.

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<u>Fig. 188: Removing Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pull out locks (1) in direction of arrow and remove rain sensor (2).

Disconnect plug connection (3) and remove rain sensor (2).

Installation:

Do not damage optical element covered by rain sensor (2).

If necessary, initialize rain sensor (2).

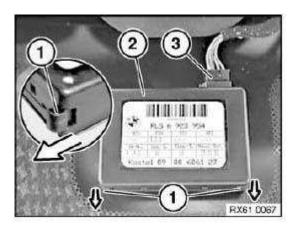


Fig. 189: Pulling Out Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out programming/coding.

61 35 680 INITIALIZING RAIN SENSOR

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NOTE: Initialization is necessary:

- After replacing windscreen
- After replacing rain sensor
- After installing a used rain sensor

NOTE:

- Connect BMW diagnosis system
- Initialize rain sensor

61 35 950 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR COMFORT ACCESS SYSTEM

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

NOTE: The comfort access system is a radio-based system and can be interfered with by radio waves from other systems (e.g. mobile phone).

Necessary preliminary tasks:

• Remove side trim panel at rear right

Unscrew nuts (1).

Disconnect plug connection (2) and remove control unit for Comfort Access System.

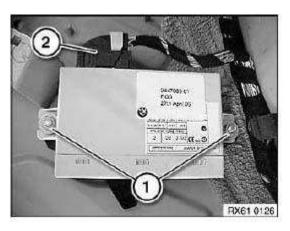


Fig. 190: Identifying Plug Connection And Nuts Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

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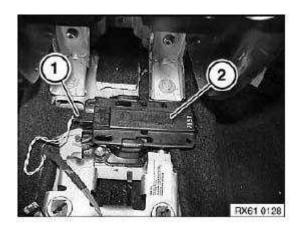
61 35 953 REMOVING AND INSTALLING/REPLACING INTERIOR ANTENNA FOR COMFORT ACCESS SYSTEM (STORAGE COMPARTMENT, FRONT)

Necessary preliminary tasks:

• Remove storage compartment

Disconnect plug connection (1).

Pull interior antenna (2) out of mounting.



<u>Fig. 191: Identifying Plug Connection And Interior Antenna</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 35 954 REMOVING AND INSTALLING/REPLACING INTERIOR ANTENNA FOR COMFORT ACCESS SYSTEM (REAR SEAT)

Necessary preliminary tasks:

• Remove rear seat

Disconnect plug connection (1).

Unlock catches (3) and remove interior antenna for comfort access system (2) in direction of arrow from holder.

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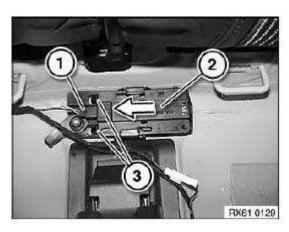


Fig. 192: Unlocking Catches
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 958 REMOVING AND INSTALLING/REPLACING INTERIOR ANTENNA FOR COMFORT ACCESS SYSTEM ON LEFT OR RIGHT (SIDE TRIM PANEL)

Necessary preliminary tasks:

• Remove rear side trim panel

Disconnect plug connection (1).

Unlock catches (3) and remove interior antenna for comfort access system (2) in direction of arrow from holder.

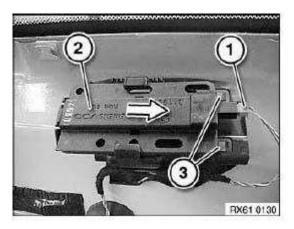


Fig. 193: Removing Interior Antenna Courtesy of BMW OF NORTH AMERICA, INC.

61 35 975 REMOVING AND INSTALLING/REPLACING BUMPER ANTENNA FOR COMFORT ACCESS SYSTEM

Necessary preliminary tasks:

• Remove rear bumper trim

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Disconnect plug connection (1).

Pull interior antenna (2) out of mounting.

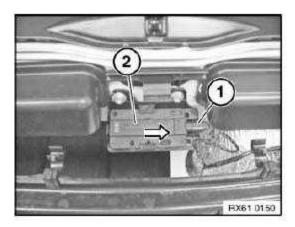


Fig. 194: Pulling Interior Antenna Courtesy of BMW OF NORTH AMERICA, INC.

VEHICLE PROGRAMMING AND CODING

Select menu item (1).

Select corresponding procedure from selection list.

Example:

- Preparation and subsequent evaluation of vehicle programming
- Start a Progman session
- Sequence of BMW/MINI vehicle programming and coding
- BMW/MINI Car & Key Memory
- BMW/MINI initializations
- BMW/MINI service functions in Progman
- ...

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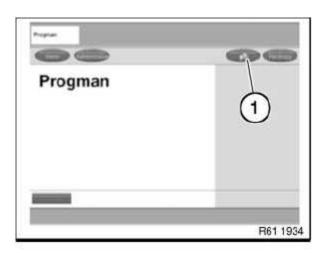


Fig. 195: Display Of Vehicle Programming And Coding Courtesy of BMW OF NORTH AMERICA, INC.

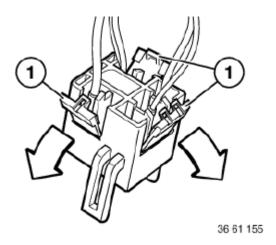
NOTE:

In order to avoid incorrect programming procedures and error messages, it is essential when working with the Progman programming system always to use the latest Progman version.

36 RELAYS

61 13 ... DME MASTER RELAY CONNECTOR

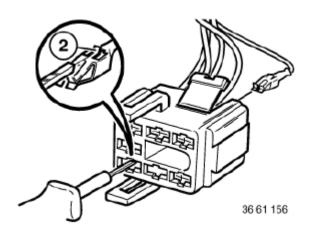
Unlock locking flap (1) of corresponding cable.



<u>Fig. 196: Unlocking Locking Flap</u> Courtesy of BMW OF NORTH AMERICA, INC.

With special tool 61 1 136 or 61 1 137 (ejector), press back arrester hook (2) of appropriate contact and pull out cable.

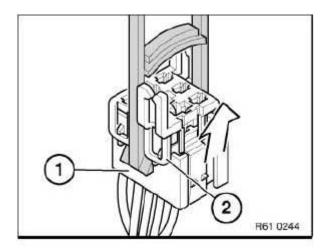
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<u>Fig. 197: Identifying Arrester Hook</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... RELAY CARRIER

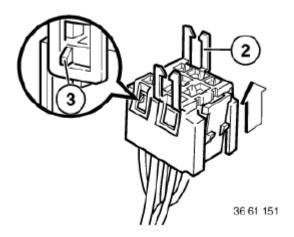
Place special tool 61 1 153 on relay carrier (1) and carefully pull in direction of arrow until retaining lugs (2) on relay carrier are raised.



<u>Fig. 198: Identifying Relay Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pull relay carrier (2) in direction of arrow into first catch (3).

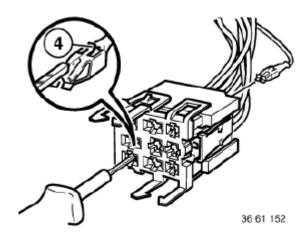
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<u>Fig. 199: Pulling Relay Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press down arrester hook (4) of appropriate contact and pull out cable with contact.

Press out double flat spring contact with special tool 61 1 136 or 61 1 137 (ejector).



<u>Fig. 200: Identifying Arrester Hook</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 36 ... REMOVING AND INSTALLING/REPLACING RELAY (RELAY BOX IN ENGINE COMPARTMENT ON BULKHEAD)

Necessary preliminary tasks:

• Open engine bonnet/hood

Unlock lug (1) and detach relay box (2).

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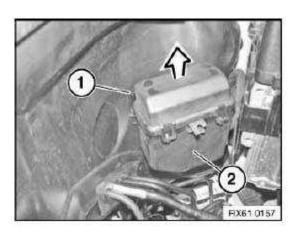


Fig. 201: Unlocking Lug Courtesy of BMW OF NORTH AMERICA, INC.

Unlock lug (1) and remove cover (2).

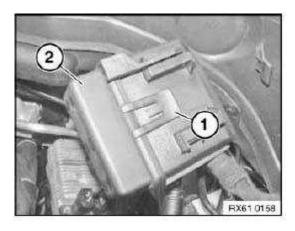
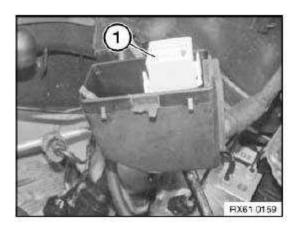


Fig. 202: Identifying Lug And Cover Courtesy of BMW OF NORTH AMERICA, INC.

Detach relay (1).



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Fig. 203: Identifying Relay

Courtesy of BMW OF NORTH AMERICA, INC.

61 36 ... REMOVING AND INSTALLING/REPLACING RELAY FOR WINDSCREEN HEATER

Necessary preliminary tasks:

• Remove front left entrance cover strip

Detach relay (1).

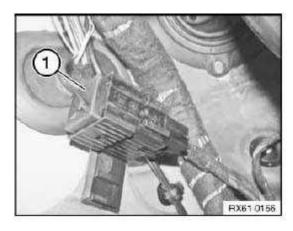


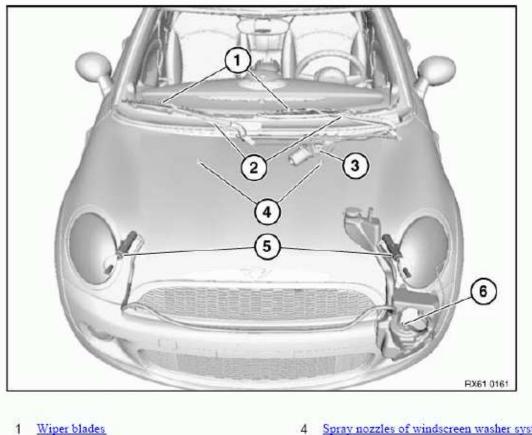
Fig. 204: Identifying Relay

Courtesy of BMW OF NORTH AMERICA, INC.

61 WINDSCREEN WIPER

61 61 ... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)

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- Windscreen wiper arms
- 3 Bracket for windscreen washer system complete with motor
- Spray nozzles of windscreen washer system
- 5 High-pressure nozzles for headlight washer system
- 6 Fluid reservoir/washer pump

Fig. 205: Identifying Windscreen Washer System And Headlight Washer System (SRA) Components Courtesy of BMW OF NORTH AMERICA, INC.

61 61 01. ADJUSTING LEFT OR RIGHT WINDSCREEN WIPER

Special tools required:

• 61 6 100

Correctly adjusting the contact angle of the wiper arms on the windscreen increases wiping quality.

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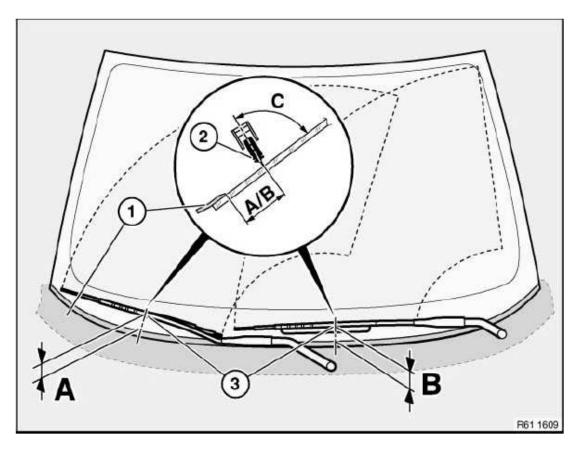


Fig. 206: Identifying Contact Angle Of Wiper Arms On Windscreen Courtesy of BMW OF NORTH AMERICA, INC.

A/B= Distance between windscreen wiper blade (2) and trim panel on cowl panel (1)

NOTE: Measurement is taken at the height of the locators (3) for the windscreen wiper arms

C= Contact angle between wiper blade center plane and windscreen

When adjusting with special tool 61 6 100, set the scale value in accordance with the following table.

For RHD cars, change the preceding sign of the scale values.

- LHD cars, scale range 0 to -10
- RHD cars, scale range 0 to +10

SCALE RANGE SPECIFICATION

SCHEE WINGE STEELINGT											
Model		0 \ 1		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		Adjustment dimension (A, B) on windscreen wiper arm					
	Passenger side	Driver side	Passenger side	Driver side		Driver side	Rear end				

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R50/R52/R53/R56	87° ± 1°	87° ± 1°	-3	-3	$59 \pm 2.5 \text{ mm}$	49 ± 2.5	44 ± 3
						mm	mm

61 61 010 CHECKING/ADJUSTING CONTACT ANGLE OF WINDSCREEN WIPER ARMS ON WINDSCREEN

Special tools required:

- 00 9 220
- 00 9 230
- 61 6 100

NOTE: Wipe quality is improved by precise adjustment of contact/approach angle of wiper arms.

Adjustment angle can be checked with special tool 00 9 230 or 61 6 100.

Checking with setting gauge:

Before checking approach angle, briefly lift windscreen wiper arms off windscreen.

Place special tool 00 9 230 next to pivot point of wiper blade on windscreen.

Check light gap, adjust wiper arm if necessary.

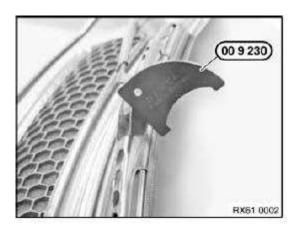


Fig. 207: Identifying Special Tool (00 9 230)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Tape off wiper arm with fabric adhesive tape to avoid damage.

Press special tools 00 9 220 in appropriate direction until correct contact/approach angle is obtained.

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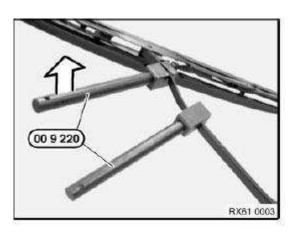


Fig. 208: Identifying Special Tool (00 9 220) Courtesy of BMW OF NORTH AMERICA, INC.

Checking with angulometer:

Remove wiper blades.

Insert windscreen wiper arm (1) in angulometer 61 6 100.

Using screw (2) and pressure plate (3), locate windscreen wiper arm (1) and position on windscreen.

Read off value in degrees, adjust wiper arm if necessary.

NOTE:

Windscreen wiper arm (1) must rest correctly on lower and side contact surfaces (4) of angulometer 61 6 100.

On right-hand-drive cars, screw (2) must be located on left side of special tool 61 6 100.

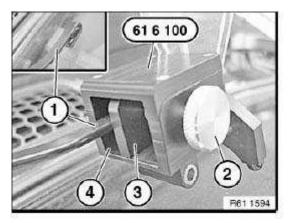


Fig. 209: Identifying Special Tool (61 6 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tools 00 9 220 in appropriate direction until correct contact/approach angle is obtained.

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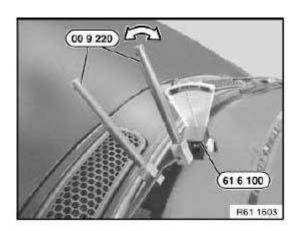


Fig. 210: Identifying Special Tool (00 9 220)
Courtesy of BMW OF NORTH AMERICA, INC.

61 61 010 CHECKING/ADJUSTING CONTACT ANGLE OF WINDSCREEN WIPER ARMS ON WINDSCREEN

Special tools required:

- 00 9 220
- 61 6 100

NOTE:

Wipe quality is improved by precise adjustment of contact/approach angle of wiper arms.

Adjustment angle can be checked with special tool or 61 6 100.

Checking with angulometer:

Remove wiper blades.

Insert windscreen wiper arm (1) in angulometer 61 6 100.

Using screw (2) and pressure plate (3), locate windscreen wiper arm (1) and position on windscreen.

Read off value in degrees, adjust wiper arm if necessary.

NOTE:

Windscreen wiper arm (1) must rest correctly on lower and side contact surfaces (4) of angulometer 61 6 100.

On right-hand-drive cars, screw (2) must be located on left side of special tool 61 6 100.

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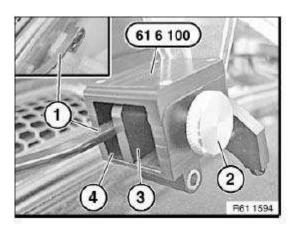


Fig. 211: Identifying Special Tool (61 6 100) Courtesy of BMW OF NORTH AMERICA, INC.

Press special tools 00 9 220 in appropriate direction until correct contact/approach angle is obtained.

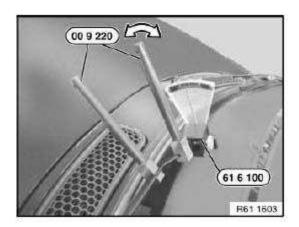
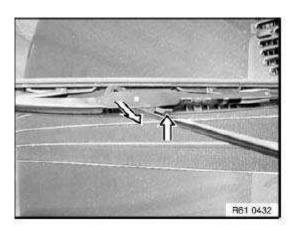


Fig. 212: Identifying Special Tool (00 9 220) Courtesy of BMW OF NORTH AMERICA, INC.

61 61 041 REPLACING BOTH WINDSCREEN WIPER BLADES

Press retaining spring in direction of arrow. Pull wiper blade in direction of wiper arm and remove.

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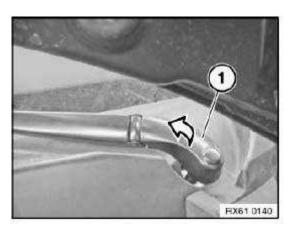
<u>Fig. 213: Pressing Retaining Spring</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 61 081 REPLACING LEFT OR RIGHT WINDSCREEN WIPER ARM

Special tools required:

• 61 6 130

Remove protective cap (1).



<u>Fig. 214: Removing Protective Cap</u> Courtesy of BMW OF NORTH AMERICA, INC.

Retaining lugs (1) and fasteners (2) of protective cap (3) must not be damaged.

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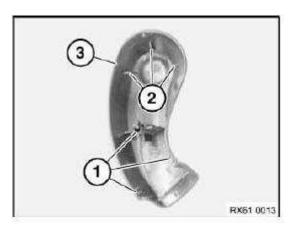


Fig. 215: Identifying Retaining Lugs And Fasteners Of Protective Cap Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Installation:

Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

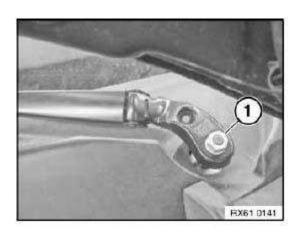


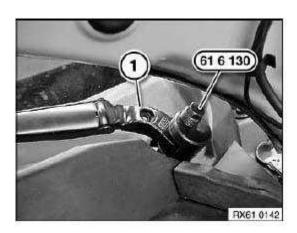
Fig. 216: Identifying Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off wiper arm with special tool 61 6 130.

Installation:

Adjust wiper arm to rest position.

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<u>Fig. 217: Identifying Special Tool (61 6 130)</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 61 270 REMOVING AND INSTALLING/REPLACING BRACKET FOR WINDSCREEN WIPER SYSTEM COMPLETE WITH MOTOR

Necessary preliminary tasks:

• Remove left cowl panel cover

Unscrew nut (1).

Installation:

Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES** .

Make sure holder is correctly positioned in relation to grommet.

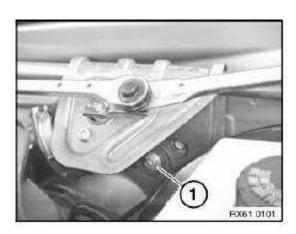


Fig. 218: Identifying Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

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Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

Disconnect plug connection (2).

Remove wiper bracket.

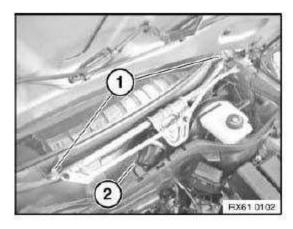


Fig. 219: Identifying Wiper Bracket Screw Courtesy of BMW OF NORTH AMERICA, INC.

62 REAR WINDOW WIPER

61 62 020 REPLACING WIPER BLADE FOR REAR WINDOW WIPER

IMPORTANT: Make sure the wiper arm does not contact the rear window without its wiper blade.

Lift back wiper arm for rear window wiper (1) and wiper blade for rear window wiper (2).

Unclip wiper blade for rear window wiper (2) in direction of arrow from wiper arm for rear window wiper (1) and remove.

Installation:

Make sure wiper blade for rear window wiper (2) is correctly engaged on wiper arm for rear window wiper (1).

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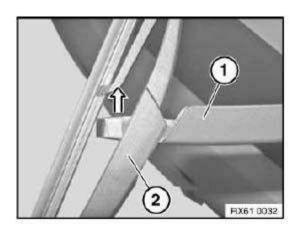


Fig. 220: Lifting Back Wiper Arm For Rear Window Wiper Courtesy of BMW OF NORTH AMERICA, INC.

61 62 030 REPLACING (REMOVING AND INSTALLING) WIPER ARM FOR REAR WINDOW WIPER

Special tools required:

• 61 6 210

Open protective cap (1).

Slacken nut (3) two turns.

Tightening torque, 61 62 1AZ.

IMPORTANT: To avoid damaging the spray nozzle, it is necessary in addition to the special tool to use a suitable socket for detaching the rear window wiper from the wiper motor.

Press off wiper arm (2) with special tool 61 6 210 and suitable socket (4).

Unscrew nut (3).

Remove wiper arm (2).

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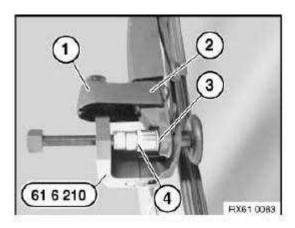


Fig. 221: Identifying Special Tool (61 6 210) Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

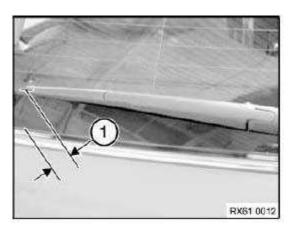
Rear window wiper must be in rest position.

Adjust distance (1) between wiper arm and rear window edge.

(1) 44 mm

Replacement:

Remove and install rear window wiper blade.



<u>Fig. 222: Identifying Distance Between Wiper Arm And Rear Window Edge</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 62 060 REMOVING AND INSTALLING/REPLACING REAR WINDOW WIPER MOTOR

Necessary preliminary tasks:

• Remove wiper arm for rear window wiper

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• Remove trim for rear lid at bottom

Pull off hose (1).

Disconnect plug connector (2).

Release screws (3).

Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

Pull rear window wiper motor out of rear window grommet.

Installation:

Check wiper shaft grommet for signs of damage.

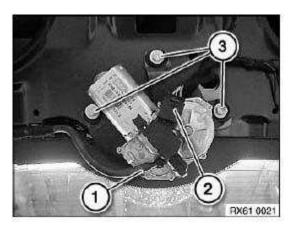
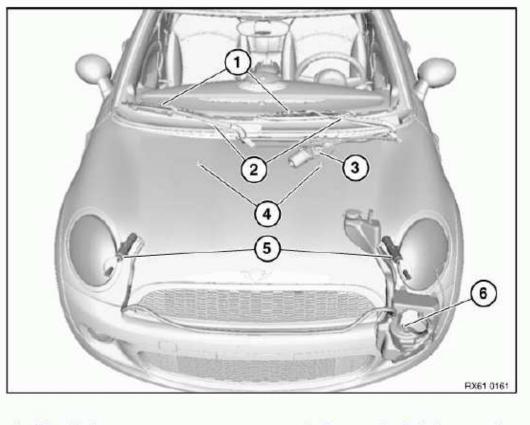


Fig. 223: Identifying Plug Connector And Screw Courtesy of BMW OF NORTH AMERICA, INC.

67 HEADLIGHT WASHER SYSTEM

61 61 ... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)

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- 1 Wiper blades
- 2 Windscreen wiper arms
- 3 Bracket for windscreen washer system complete with motor
- 4 Spray nozzles of windscreen washer system
- 5 High-pressure nozzles for headlight washer system
- 6 Fluid reservoir/washer pump

Fig. 224: Identifying Windscreen Washer System And Headlight Washer System (SRA) Courtesy of BMW OF NORTH AMERICA, INC.

61 67 010 REMOVING AND INSTALLING/REPLACING WASHER PUMP OF HEADLIGHT CLEANING SYSTEM

Necessary preliminary tasks:

- Partially detach front left wheel arch trim.
- Drain fluid tank for windscreen washer system.

Open lock (1) and detach hose from washer pump for headlight cleaning system (3).

Disconnect plug connection (2).

Pull washer pump for headlight cleaning system (3) out of fluid reservoir for headlight cleaning system.

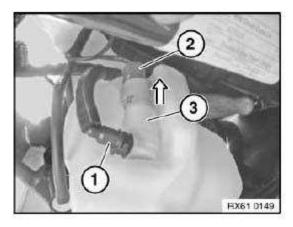
Installation:

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Replace sealing ring on washer pump for headlight cleaning system.

Coat sealing ring of washer pump for headlight cleaning system with anti-seize agent.

Make sure hose is laid without kinks.



<u>Fig. 225: Pulling Washer Pump For Headlight Cleaning System</u> Courtesy of BMW OF NORTH AMERICA, INC.

61 67 083 REMOVING AND INSTALLING / REPLACING LEFT OR RIGHT HIGH-PRESSURE NOZZLE OF HEADLIGHT WASHER SYSTEM

Necessary preliminary tasks:

• Remove headlight

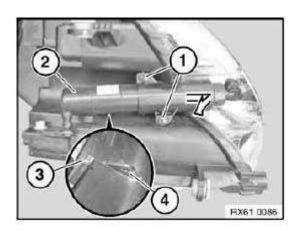
Release screws (1).

Remove high-pressure nozzle (2) in direction of arrow.

Installation:

Make sure guide (3) is correctly seated in lug (4).

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<u>Fig. 226: Removing High-Pressure Nozzle</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press holder (1) for chrome trim in direction of arrow off high-pressure nozzle.

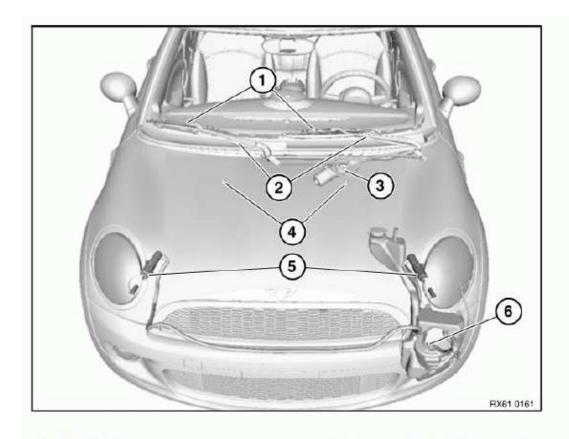


Fig. 227: Pressing Holder For Chrome Trim Courtesy of BMW OF NORTH AMERICA, INC.

71 WINDOW WASHER SYSTEM

61 61 ... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)

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- 1 Wiper blades
- 2 Windscreen wiper arms
- 3 Bracket for windscreen washer system complete with motor
- 4 Spray nozzles of windscreen washer system
- 5 High-pressure nozzles for headlight washer system
- 6 Fluid reservoir/washer pump

Fig. 228: Windscreen Washer System And Headlight Washer System (SRA) Components Courtesy of BMW OF NORTH AMERICA, INC.

61 71 015 REMOVING AND INSTALLING/REPLACING A SPRAY NOZZLE IN WINDSCREEN WASHER SYSTEM

Pull off hose (1).

Disconnect plug connection (2).

Press out spray nozzle of windscreen washer system in direction of arrow.

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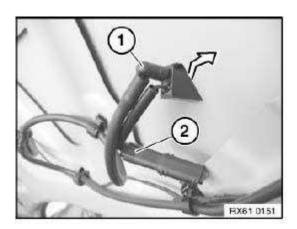


Fig. 229: Disconnecting Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

61 71 061 REPLACING FLUID RESERVOIR FOR WINDSCREEN WASHER SYSTEM

Necessary preliminary tasks:

- Remove front left wheel arch trim
- Remove left headlight
- Drain fluid tank for windscreen washer system.

Release expander rivet (1) on fluid tank for windscreen washer system (2).

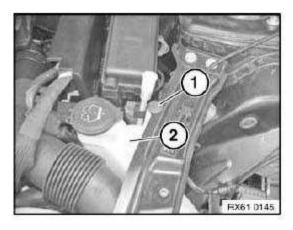


Fig. 230: Identifying Expander Rivet Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect hoses (2).

Release screws (3).

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Tightening torque. Refer to **GENERAL ELECTRICAL SYSTEM - TIGHTENING TORQUES**.

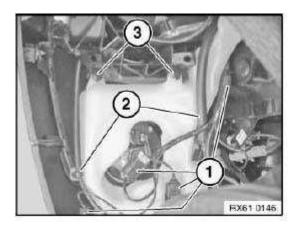


Fig. 231: Identifying Plug Connection And Hoses Courtesy of BMW OF NORTH AMERICA, INC.

Using a suitable tool, press underside of fluid reservoir for windscreen washer system out of opening (2).

Feed out fluid reservoir for windscreen washer system.

Remove level switch for windscreen washer system.

Remove windscreen washer pump.

Remove washer pump for headlight cleaning system.

Installation:

Guide (1) must be correctly seated in opening (2).

Make sure hoses/lines (2) are laid without kinks.

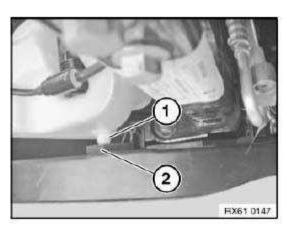


Fig. 232: Identifying Guide And Seat

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Courtesy of BMW OF NORTH AMERICA, INC.

61 71 100 REMOVING AND INSTALLING/REPLACING WINDSCREEN WASHER PUMP

Necessary preliminary tasks:

- Partially detach front left wheel arch trim.
- Drain fluid tank for windscreen washer system.

Disconnect plug connection (1).

Disconnect hoses (2).

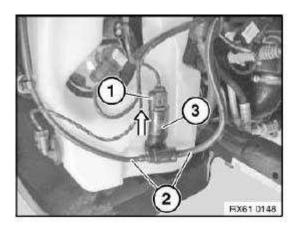
Pull windscreen washer pump (3) out of fluid reservoir for windscreen washer system.

Installation:

Replace sealing ring on windscreen washer pump (3).

Coat sealing ring of windscreen washer pump (3) with anti-seize agent.

Make sure hoses (2) are laid without kinks.



<u>Fig. 233: Pulling Windscreen Washer Pump</u> Courtesy of BMW OF NORTH AMERICA, INC.

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HVAC - Overview - MINI

MINI CLIMATE CONTROL

MINI CLIMATE CONTROL

Air Conditioning in standard on the MINI COOPER and COOPER S. The standard system IHKS is a manually controlled basic air conditioning system. Driver input is required to regulate temperature, air direction and air speed.

Available as an option on both models is the IHKA system. This system is able to function as a totally automatic climate control, affecting outlet temperature, air direction and air speed. The IHKA automatic functions may be overridden giving the driver a more precise manual control than is available with the IHKS system.

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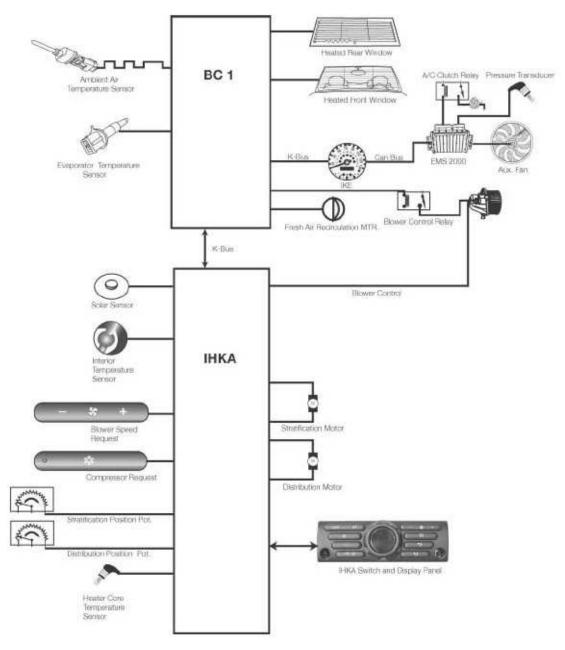


Fig. 1: Communication Diagram - MINI Climate Control Courtesy of BMW OF NORTH AMERICA, INC.

Purpose of the System

The purpose of the Climate Control system is to control the temperature and distribution of air supplied to the vehicle interior. The Climate Control system is responsible for the heating or cooling of the air coming into the passenger compartment as well as the heating for the rear window and windshield.

Two systems are available on the MINI:

• IHKS (Standard on MINI COOPER and MINI COOPER S)

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• IHKA (Optional on MINI COOPER and MINI COOPER S)



IHKS Control Unit

Not connected to K-Bus, No diagnostic capabilities

Fig. 2: IHKS Control Unit Courtesy of BMW OF NORTH AMERICA, INC.



IHKA Control Unit

Connected Directly to K-Bus, Fully diagnosable

Fig. 3: IHKA Control Unit Courtesy of BMW OF NORTH AMERICA, INC.



IHKA Control Unit

Redesigned IHKA 2005 MY

Fig. 4: IHKA Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

System Components

Both systems (IHKS and IHKA) consist of a refrigerant system, a heater system and a control system. The refrigerant system is the same on both, the heater assembly and control systems are different.

Refrigerant System (IHKS and IHKA)

The Refrigerant System transfers heat from the vehicle interior to the outside atmosphere providing the heater assembly with dehumidified cool air. The system is a sealed, closed loop, filled with a charge weight (350 grams) of R134a refrigerant as the heat transfer medium. Oil is added to the refrigerant to lubricate the internal components of the compressor.

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The refrigerant system consists of the following components:

- R134a Refrigerant and Lubricant
- Compressor
- Evaporator
- Condenser
- Receiver/Drier
- Expansion Valve
- Cooling Fan
- Pressure Transducer
- Evaporator Temperature Sensor
- Refrigerant Lines

R134a Refrigerant

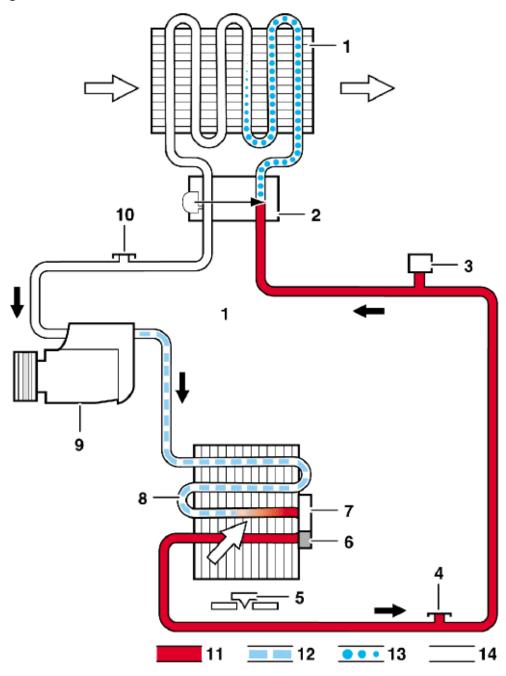
An air conditioning system uses refrigerant to absorb heat from the air that passes through the evaporator. Refrigerants are special materials that are vapors at room temperature and liquids at much lower temperatures. Automotive refrigerants boil at -16°F to -22°F (-27°C to -30°C). Refrigerants are also able to contain and transport a large amount of heat, efficiently, and can be evaporated and condensed over and over without being damaged.

In the air conditioning system, liquid refrigerant under high pressure flows through a small hole into the evaporator, where the pressure is then greatly reduced. When the pressure drops, the refrigerant boils and changes from a liquid to a vapor. As it changes its state, it absorbs a large amount of heat.

As the air passing through the evaporator gives up some of its heat, it becomes colder; it can then be blown into the passenger compartment, to cool it. Once the refrigerant has absorbed heat from the air, it is returned to the compressor. The A/C system removes the excess heat from the refrigerant as the refrigerant passes through the condenser.

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A/C Refrigerant Circuit



- Evaporator
- 2. Expansion Valve
- 3. Pressure Transducer
- 4. High Pressure Service Port
- 5. Cooling Fan
- 6. Filter
- 7. Desiccant

- 8. Condenser
- 9. Compressor
- 10. Low Pressure Service Port
- 11. High Pressure Liquid
- 12. High Pressure Gas
- 13. Low Pressure Liquid
- 14. Low Pressure Gas

Fig. 5: A/C Refrigerant Circuit Operation Diagram Courtesy of BMW OF NORTH AMERICA, INC.

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Compressor

The compressor in an automotive A/C system serves two important functions:

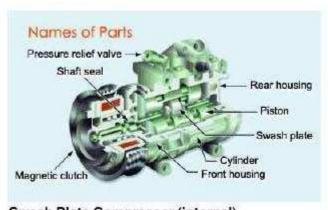
- It creates a low-pressure zone at the compressor inlet, to draw refrigerant vapor from the evaporator.
- It compresses the low-pressure refrigerant vapor into a high-pressure vapor and sends it toward the condenser.

The compressor is a swash plate unit with variable displacement, bolted to an engine bracket, driven by an electromagnetic clutch.

By matching refrigerant flow to the thermal load of the evaporator, the variable compressor maintains a relatively constant evaporator outlet temperature of approximately 3 to 4°C (37 to 39°F).



Fig. 6: Compressor Mounted On Engine
Courtesy of BMW OF NORTH AMERICA, INC.



Swash Plate Compressor (internal)

Fig. 7: Swash Plate Compressor Courtesy of BMW OF NORTH AMERICA, INC.

Compressor Clutch

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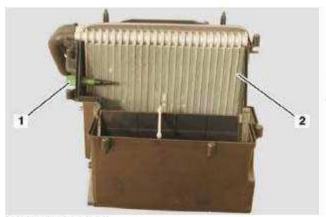
The compressor pulley is driven by a belt from the crankshaft; a compressor clutch is used to engage/disengage the pulley and driveshaft. The clutch is electromagnetic. When power is provided to the clutch, the clutch engages and rotates the compressor drive shaft. When the power is cut off, the clutch disengages and the compressor pulley free-wheels. The compressor is cycled on and off, according to evaporator temperature; it is also cycled off at full-throttle, standing start acceleration conditions.

NOTE: The Compressor and clutch can only be replaced as a complete unit.

Evaporator

The evaporator is located in the heater assembly and uses an encapsulated sensor to measure the temperature of the air coming off the evaporator. The evaporator is installed in the heater assembly after the blower and absorbs heat from the exterior or re-circulated inlet air. Low pressure, low temperature refrigerant changes from liquid to vapor in the evaporator, absorbing large quantities of heat as it changes state.

The evaporator (like the condenser) is a "heat exchanger." As air passes over the evaporator fins, the moisture condenses on the fins as the air cools. Water collects in the bottom part of the housing and exits the drain.



- Evaporator Temperature sensor
- 2. Evaporator

A/C Evaporator

Fig. 8: Evaporator And Evaporator Temperature Sensor Courtesy of BMW OF NORTH AMERICA, INC.

Condenser

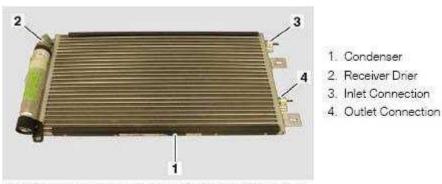
The condenser with integrated receiver/drier is installed in front of the radiator. The receiver/drier is a replaceable unit, located in a threaded housing at the lower end and retained by a plastic bracket at the top.

The condenser is a heat exchanger similar to the radiator and evaporator. It transfers heat from the refrigerant to the surrounding air to convert the vapor from the compressor into a liquid.

Receiver/Drier

A receiver/drier integrated in the condenser assembly removes moisture and solid impurities from the refrigerant, and provides a reservoir of liquid refrigerant to accommodate flow changes at the evaporator.

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A/C Condenser with Integrated Receiver Drier

Fig. 9: A/C Condenser With Integrated Receiver Drier Courtesy of BMW OF NORTH AMERICA, INC.

Expansion Valve

The expansion valve meters the flow of refrigerant into the evaporator to match the refrigerant flow with the heat of the air passing through the evaporator.

The expansion valve is attached to the inlet and outlet ports of the evaporator. The valve consists of an aluminum housing containing inlet and outlet. The expansion valve controls the amount of refrigerant released into the evaporator. It is fitted to the evaporator inlet/outlet pipes. The valve separates the high-pressure side of the system from the low-pressure side. A small passage, or "orifice," allows only a small amount of liquid into the evaporator. The amount of refrigerant that it allows through depends on the evaporator temperature and pressure, and the temperature of the air passing through the evaporator.



1. Expansion Valve

<u>Fig. 10: Expansion Valve</u> Courtesy of BMW OF NORTH AMERICA, INC.

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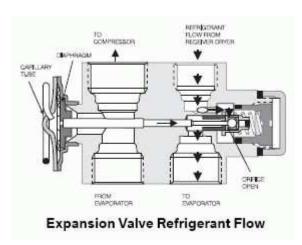


Fig. 11: Expansion Valve Refrigerant Flow Diagram Courtesy of BMW OF NORTH AMERICA, INC.

A block-valve design of expansion valve is used on MINI A/C systems. The refrigerant enters at the upper right inlet. At the left of the valve there is a capillary tube filled with an inert gas, that senses the temperature of the air coming into the housing from the plenum. When the air temperature in the plenum rises, the pressure in the capillary tube increases. This pushes down on a diaphragm and pushrod assembly, which increases the size of the orifice opening, allowing more refrigerant into the evaporator and providing more cooling. When plenum temperature falls, the pressure in the capillary tube falls. The spring pushes up on the pushrod, making the orifice opening smaller; less refrigerant is allowed into the evaporator, allowing less cooling.

Cooling Fan

The condenser on the A/C systems interfaces with the EMS2000 over the bus network for electric fan operation. The electric fan is not directly controlled by the A/C system. The EMS2000 controls the fan via two relays.

This provides additional air flow through the radiator and condenser, when needed. The additional air flow allows more heat to be taken away from the condenser and thus allowing better cooling of the refrigerant.

Pressure Transducer

The Pressure Transducer is fitted into the high-pressure line between the condenser and the expansion valve, on the drivers side rear of the engine compartment, under the battery.

The pressure transducer signals EMS2000 for compressor control and engine electric cooling fan operation.

Because the compressor is lubricated by oil suspended in the refrigerant, the EMS2000 prevents operation of the compressor unless there is a minimum refrigerant pressure, and thus refrigerant and oil, in the system.

When refrigerant pressure increases the EMS2000 increases cooling fan speed to provide more airflow across the condenser

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Pressure Transducer

<u>Fig. 12: Pressure Transducer</u> Courtesy of BMW OF NORTH AMERICA, INC.

Evaporator Temperature Sensor

The Evaporator Temperature Sensor is located on the left side of the heater case and signals directly to the BC1.

The sensor is an encapsulated thermistor that provides the BC1 with an input of the evaporator air outlet temperature.



Evaporator Temperature Sensor

Fig. 13: Evaporator Temperature Sensor Courtesy of BMW OF NORTH AMERICA, INC.

Refrigerant Lines

To maintain similar flow velocities around the system, the diameter of the Refrigerant Lines varies to suit the two-pressure/temperature conditions. The larger diameters are installed in the low pressure/temperature zone and the smaller diameters are installed in the high pressure/temperature zone. Low and high pressure service fittings are incorporated into the refrigerant lines for system servicing.

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Fig. 14: Refrigerant Lines - A/C Service Fitting Courtesy of BMW OF NORTH AMERICA, INC.



A/C Lines at Condenser

Fig. 15: Refrigerant Lines - A/C Lines At Condenser Courtesy of BMW OF NORTH AMERICA, INC.

Principle of Operation

The basic principle at work in a climate control system is heat transfer. An automotive A/C system takes heat from inside the passenger compartment and transfers it outside.

In an A/C system, heat is transferred using a refrigerant. The refrigerant absorbs heat from air entering the passenger compartment, carries the heat outside the compartment, releases the heat, and then re-enters the compartment to begin the cycle again.

An A/C system does not "add cold" to air - it removes some of the heat from it. Some heat is always present, but the less heat the air contains, the cooler it feels.

An air conditioning system's efficiency is based on how well it moves heat. Heat always travels from warm to cold. The reverse is never true. For example, if a hot cup of coffee is left standing, it will cool off, while a cold soda will get warm. The heat from the warm coffee moves to the cooler surrounding air. The heat from the surrounding air moves to the cooler soda, until a balance is reached.

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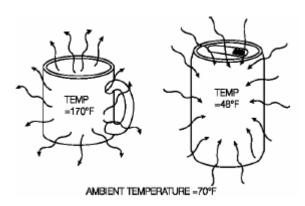


Fig. 16: Ambient Temperature
Courtesy of BMW OF NORTH AMERICA, INC.

Temperature and State Changes

At sea level, water freezes at 32°F (0°C) and boils at 212°F (100°C). These are the temperatures at which water changes state. When a liquid boils (changes to a gas), it absorbs heat. When a gas condenses (changes back to a liquid), it gives off heat.

- As the pressure on a liquid is increased, the boiling point rises.
- As the pressure on a liquid is decreased, the boiling point drops.

Evaporation

Evaporation is one of the basic principles by which a refrigeration system works. In evaporation, liquid changes to a vapor. Adding heat causes a liquid to evaporate.

Condensation

Condensation is the reverse of evaporation. In condensation, a vapor changes to a liquid. Removing heat causes a vapor to condense to a liquid.

The task of an air conditioning system is to absorb a large amount of heat, move it away from the passenger compartment, and exhaust it. When the refrigerant in the A/C system evaporates, it absorbs a large amount of heat from the air entering the passenger compartment.

As the refrigerant vapor is pumped outside the passenger compartment, it transports this heat with it. When the refrigerant condenses back into a liquid, this heat is released.

Compressor

When AC is requested, the clutch is energized and the pulley drives the shaft. The journal and the swash plate turn with the shaft, and the angled swash plate produces reciprocating movement of the pistons. Vapor from the inlet pressure chamber is drawn into the cylinder, compressed, and discharged into the outlet pressure chamber, producing a flow around the refrigerant circuit.

The flow rate through the compressor is determined by the length of the piston stroke, which is controlled by

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the tilt angle of the swash plate. The tilt angle of the swash plate is controlled by the servo pressure and compressor inlet pressure acting on the pistons during their induction stroke. A relative increase of inlet pressure over servo pressure moves the pistons along their cylinders to increase the tilt angle, the piston stroke and the flow rate. Similarly, a relative decrease of inlet pressure over servo pressure moves the pistons along their cylinders to reduce the tilt angle, the piston stroke and the flow rate.

The control valve regulates the servo pressure in the crankcase as a function of inlet pressure, so that the flow rate of the compressor matches the thermal load at the evaporator, i.e. the more cooling required in the passenger compartment, the higher the thermal load and flow rate. Servo pressure varies between inlet pressure and inlet pressure ± 0.07 bar (± 1 psi).

As the refrigerant flows through the evaporator and absorbs heat (i.e. as the thermal load increases) the pressure of the vapor entering the compressor increases. In the control valve, the increased inlet pressure causes the diaphragm and push rod to close the ball valve. The resulting reduction in crankcase pressure, together with the increase in inlet pressure, moves the swash plate to a higher tilt angle and increases the piston stroke and the flow through the compressor.

When the thermal load of the evaporator decreases, the subsequent decrease in pressure of vapor entering the compressor causes the control valve to open. This increases swash plate crankcase pressure, which reduces the tilt angle of the swash plate and the flow through the compressor.

Condenser

The condenser, being directly downstream of the compressor, receives the high pressure vapor gas and the condensation process begins.

The unit is classified as an integrated, sub-cooling condenser and consists of a fin and tube heat exchanger installed between two end tanks. Divisions in the end tanks separate the heat exchanger into a three pass upper (condenser) section and a single pass lower (sub-cooler) section, which are interconnected by a receiver drier on the left hand end tank.

Although the receiver/drier is integral with the condenser, It contains a desiccant pack and filter that are replaceable as a unit. It is secured with a metal screw and is retained by a plastic bracket at the top of the condenser.

Ambient air, passing through the condenser due to ram effect and/or the cooling fan, absorbs heat from the refrigerant to change it from a vapor to a liquid. The condenser section cools and liquefies the refrigerant before it enters the receiver/drier

Drier

From the condenser, liquid refrigerant under high pressure flows to the receiver/drier. The drier consists of a cylindrical tank to hold the refrigerant and a solid drier. The solid drier is made from zeoliite, molecular sieves and aluminum oxides. The drier is designed to separate the refrigerant vapor from the liquid so that only the liquid is fed to the expansion valve.

After the refrigerant has passed through the condenser the remaining gas in the refrigerant liquefies and passes through the desiccant and filter removing moisture and solid impurities. The refrigerant flows into the sub-

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cooler section where it is further cooled resulting in the refrigerant at the outlet being almost 100% liquid.

Expansion Valve and Evaporator

The refrigerant, now a high pressure liquid is passed via the refrigerant lines to the expansion valve at the entrance to the evaporator. A ball and spring metering valve is installed in the inlet passage of the expansion valve. The metering valve is controlled by a temperature sensitive tube connected to a diaphragm. The top of the diaphragm senses evaporator outlet pressure and the tube senses evaporator outlet temperature.

Liquid refrigerant flows through the metering valve into the evaporator. The restriction across the metering valve reduces the pressure and temperature of the refrigerant. The restriction also changes the solid stream of refrigerant into a fine spray, to improve the evaporation process.

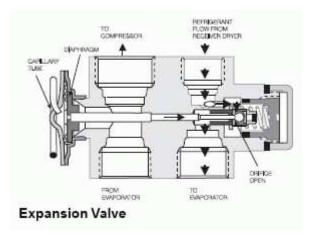


Fig. 17: Expansion Valve Operation Diagram Courtesy of BMW OF NORTH AMERICA, INC.

As the refrigerant passes through the evaporator, it absorbs heat from the air flowing through the evaporator. The increase in temperature causes the refrigerant to vaporize.

The temperature and pressure of the refrigerant leaving the evaporator act on the diaphragm and temperature sensitive tube, which move to regulate the metering valve opening and so control the volume of refrigerant flowing through the evaporator. The more heat available to evaporate refrigerant the greater the volume of refrigerant allowed through the metering valve.

The refrigerant, now a low pressure gas full of latent heat removed from the passenger compartment is drawn back into the compressor. The compressor again increases the pressure of the refrigerant, making it now a high pressure vapor. This pressure increase raises the boiling point of the refrigerant, enabling it to give off heat and be condensed

HEATING SYSTEM

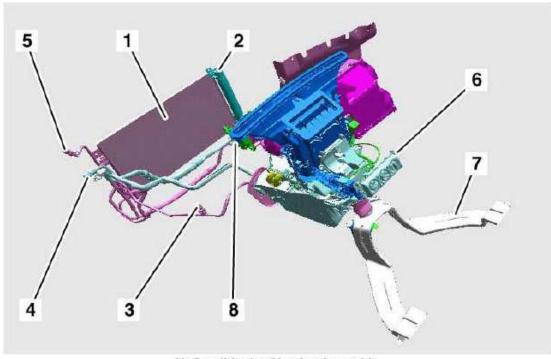
The heating and ventilation system controls the temperature and distribution of air supplied to the vehicle interior. The system consists of a micro filter housing, a heater assembly, distribution ducts, refrigerant system and a control panel. The MINI heater system uses the air blend principle: fresh air enters through vents beneath the windshield and flows into the heater assembly, a blend flap mixes the warm air passing the heat exchanger

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with the cool air and distributes it into the vehicle interior. Flow-through vents incorporated in the luggage compartment enable the air to exit the vehicle interior.

Fresh or re-circulated air passes through the filter into the heater assembly where an electrical variable speed blower, and/or ram affect, forces the air through the system. Depending on the settings on the control panel, the air is then heated or cooled and supplied through the distribution ducts to face, defrost and floor level outlets.

Two different Heating Systems are provided depending on Climate Control variation (IHKS or IHKA).



Air Conditioning/Heating Assembly

- 1. Condenser
- 2. Receiver/Drier
- 3. Pressure Transducer
- 4. Low Pressure Service Port
- 5. High Pressure Service Port
- 6. Control Panel
- 7. Rear Footwell Air Ducts
- 8. Compressor

Fig. 18: Air Conditioning/Heating Assembly Components Courtesy of BMW OF NORTH AMERICA, INC.

IHKS HEATING AND AIR DISTRIBUTION

The IHKS System allows manual selection of inlet air source, outlet air temperature, air distribution and blower speed. Components of the IHKS heating and air distribution system include:

- Microfilter
- Heater Assembly (including Air Conditioning System)
- Blower Motor and Resistor Pack
- Heater Core

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- Control Flaps
- Distribution Ducts
- Outlet Vents

Microfilter

A pollen or combination pollen/odor filter (IHKA version) is fitted to all vehicles to improve the quality of the air supply to the vehicle interior.



 Cover secured with four screws allows access to the filter. The microfilter housing is located inside the car on the passenger side.

Microfilter Housing

<u>Fig. 19: Microfilter Housing</u> Courtesy of BMW OF NORTH AMERICA, INC.



- Blower Motor
- 2. Resistor Pack
- 3: Footwell Air Outlet

Heater Assembly

Fig. 20: Heater Assembly And Components Courtesy of BMW OF NORTH AMERICA, INC.

Heater Assembly

The heater assembly heats/cools and distributes fresh or recirculated air as directed by selections made on the control panel. The assembly is installed on the vehicle center line, between the dash and the firewall, and consists of a housing, which contains a blower, a heater core, control flaps, evaporator, expansion valve, and evaporator temperature sensor.

A drain outlet in the bottom of the housing is connected to a tube installed in the right hand side of the tunnel

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that directs any condensate from the housing interior to beneath the vehicle.

Blower Motor and Resistor Pack

The blower is installed in the driver's side of the heater housing and consists of an open hub, centrifugal fan powered by an electric motor. A rotary switch on the control panel and a final stage unit control the four (4) blower speeds.

The final stage is installed in the blower motor. The blower motor must be removed from the vehicle to replace the blower control unit and the dash assembly must be removed to service the blower motor. Be sure of your diagnosis.



Blower Motor

<u>Fig. 21: Blower Motor</u> Courtesy of BMW OF NORTH AMERICA, INC.



Blower Control Final Stage

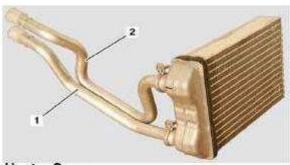
<u>Fig. 22: Blower Control Final Stage</u> Courtesy of BMW OF NORTH AMERICA, INC.

Heater Core

The heater core provides the heat source for warm the air being supplied to the distribution outlets. The heater core is an aluminum double pass, fin and tube heat exchanger, installed through the left hand side of the housing. Two aluminum tubes attached to the heater core extend through the engine bulkhead to connect the

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heater assembly to the engine coolant system. When the engine is running, coolant is **constantly** circulated through the heater core by the engine coolant pump.



- 1. Flow into Heater Core
- 2. Flow out of Heater Core

Heater Core

Fig. 23: Heater Core Courtesy of BMW OF NORTH AMERICA, INC.

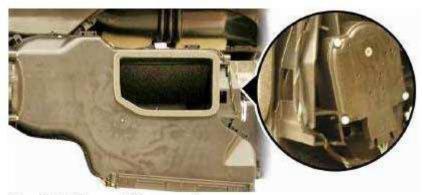
Control Flaps

Control flaps are installed in the heater assembly to control the inlet source, temperature and distribution of air.

Recirculation/Fresh Air Flap

The fresh/recirculation air flap is located in the microfilter housing and is operated by a servomotor. The BC1 controls the servomotor on request from the recirculation switch of the heater control panel.

The servomotor consists of a unidirectional electric motor with an integrated flap lever mechanism. The BC1 activates the servomotor for a maximum of 10 seconds to move the flap to one of the two end positions; no feedback on the actual position of the flap is received at the BC1 (maximum run time = 10 seconds).



Fresh Air Flap and Servomotor

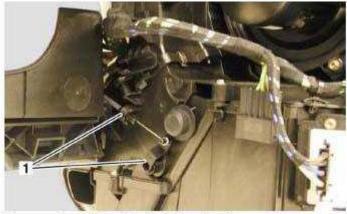
Fig. 24: Fresh Air Flap And Servomotor Courtesy of BMW OF NORTH AMERICA, INC.

Temperature Flap

A blend flap regulates the temperature of the air leaving the heater unit by mixing heated air from the heater

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core with fresh or cooled air. A rotary temperature control operates the blend flap via a Bowden cable. The flap control mechanism and cable connection (1) is on the right side of the heater unit.



1. Flap control cable connection

Temperature Flap Control Mechanism

Fig. 25: Temperature Flap Control Mechanism And Flap Control Cable Connection Courtesy of BMW OF NORTH AMERICA, INC.

Air Distribution Flaps

Three distribution flaps are installed to control the flow of air to the footwell, windshield/side windows and the face level outlets. The flaps are operated via a lever mechanism, linked to the air distribution knob on the control panel by a flexible control cable.



- 1. Flexible Control Cable
- 2. Temperature Control Cable
- Windshield and Front Side Window Outlet Control Rod
- 4. Face and Central High Level Outlet Control

Air Distribution Control

Fig. 26: Air Distribution Components
Courtesy of BMW OF NORTH AMERICA, INC.

Workshop Hint

Prior to attempting to remove the control panel, disconnect the air distribution cable (IHKS) from the rear of the control panel.

Distribution Ducts

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Three separate distribution ducts are installed for air distribution.

- The windshield and front side window outlets ducts are integrated into the dash upper.
- The face level outlets and central high-level outlet duct are attached to the dash cross car beam.
- The rear footwell duct is located in the center of the heater assembly floor outlet and extends along the floor below the front seats.

Vent assemblies in the dash allow occupants to control the flow and direction of face level air. Each vent assembly incorporates a control knob to regulate flow and is moveable to control direction.

Rear Flow-Through Vents

The flow-through vents promote the free flow of heating and ventilation air through the cabin. The flow-through vents are located in the rear panel of the luggage compartment and vent cabin air into the sheltered area between the body and the rear bumper. The vents are effectively nonreturn valves and each consists of a grille covered by soft rubber flaps. The flaps open and close automatically depending on the differential between cabin and outside air pressures.



Rear Flow-Through Vents

<u>Fig. 27: Rear Flow-Through Vents</u> Courtesy of BMW OF NORTH AMERICA, INC.

Switch Panel (IHKS)

The IHKS system uses three rotary control knobs for temperature, blower speed and air distribution control. The system has a recirculation function and may have the heated front screen as an option with the switch located in the blank above the heated rear window switch. The IHKS system also requests compressor activation from the BC1



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Fig. 28: Switch Panel (IHKS) Courtesy of BMW OF NORTH AMERICA, INC.

Temperature Dial

Turning the temperature knob on the control panel operates the control cable and in turn the blend flap in the heater assembly. The blend flap varies the proportion of air bypassing and going through the heater core. The proportion varies between FULL COLD with no airflow through the heater core and FULL HOT with 100% of airflow through the heater core. This corresponds with the position of the temperature control knob.

Blower Dial

The blower operates while the ignition is on. Switch positions are OFF or one of four speeds. The blower will function 0.5 seconds after the end of cranking. At switch positions 1, 2 and 3, the blower switch connects the B+ side of the blower to different paths through the resistor pack, to produce corresponding differences of blower operating voltage and speed. At position 4, the blower switch connects a B+ directly to the blower, bypassing the resistor pack, and full battery voltage drives the blower at maximum speed.

Air Distribution Dial

Turning the distribution knob on the control panel operates the control cable to turn the distribution flaps in the heater assembly and direct air to the corresponding outlets in the passenger compartment.

Recirculation Button

When the fresh/recirculated air switch is pressed, the switch connects a ground to the BC1. The BC1 then grounds the indicator LED in the switch and the recirculated air side of the fresh/recirculation air servomotor. The indicator LED illuminates and the fresh/recirculation air servomotor moves the control flap in the filter housing to close the fresh air inlet and open the recirculated air inlet.

Compressor Button (Snowflake)

The Compressor Button operates a ground input to the BC1 to control the on/off selection of the refrigerant system. A green indicator LED in the AC switch illuminates when the air conditioning system is switched on.

Heated Rear Window Button (HRW)

A momentary push switch controls the heated rear window and incorporates an orange LED to indicate status. A single press of the switch will turn the heated rear window on, illuminate the LED, and start a timer. When the timer has expired, the heated rear window and LED will turn off. The HRW is controlled by the BC1.

Heated Front Windshield (HFS)

The heated front screen switch is located on the control panel above the heated rear window switch. The operation and configuration of the heated front screen control is identical to the heated rear window control.

IHKS Control Unit

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The IHKS System is a manual climate control. Operator input controls air temperature, air distribution, blower speeds and compressor requests. There are no "Automatic" functions with IHKS.

Temperature Control

The operator controls air outlet temperature by positioning the temperature knob. The knob controls the cable to the blend flap. The flap is linked internally to a secondary air direction flap that optimizes airflow through the unit by ensuring the airflow does not enter the heater core area thereby preventing any unwanted hot/cold air bleed.

Engine coolant is flowing constantly through the heater core. There is no water valve. Failure of the flap to block off air flow through the heater core would provide constant heated air in the vehicle.

Blower Control

The Blower may only run if the ignition is on. There is a 0.5 second delay after engine cranking to energize the blower. This delay is controlled by the BC1. The BC1 receives the end of cranking (engine started) signal from the EMS2000. After a 0.5 second delay the BC1 energizes the Blower Relay. The Blower Relay supplies power to the 5 position blower switch (Off, 1, 2, 3, 4). Activation of the blower switch creates a power flow through the resistor pack (except in position 4). The varying voltage from the resistor pack is supplied to the blower and the BC1. The blower speed is based on the voltage supply from the resistor pack. Less resistance means higher voltage and higher blower speed. The BC1 looks for the blower speed voltage before requesting the AC compressor. Loss of blower voltage will result in loss of compressor.

IHKS Principle of Operation

Air Distribution

A single cable attached to the Control unit and the heater assembly allow the operator to control the direction of outlet air.

Fresh/Re-Circulation Air

The re-circulation switch on the control panel signals to the Body Control Module (BC1), which in turn controls the fresh/re-circulation flap via a DC servomotor. The servomotor consists of a unidirectional electric motor with a integrated flap lever mechanism and is driven end-to-end, and then switched off on a timer (maximum run time = 10 seconds).

The servomotor also has internal limit switches to disconnect power. There is no feedback to the BC1 or IHKS concerning flap position.

Heated Rear Window (HRW)

The HRW is controlled by the BC1. A momentary push of the switch signals the BC1 of the request for HRW. It is only possible to operate the heated rear window when the engine is running. When the switch is pressed with the engine running below 400 rpm nothing will happen. If the engine stalls while the HRW is on, the heated rear window and LED will switch off until the engine restarts.

The HRW on time is timer controlled.

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- The timer duration will depend upon outside ambient temperature. At 10°C (50°F) and above the HRW will operate for 12 minutes. Below 10°C (50°F) the HRW will operate for 20 minutes.
- The timer values are stored in EEPROM in the BC1.

A press of the switch while the LED is illuminated will turn the heated rear window off and extinguish the LED.

Heated Front Windshield (HFS)

The operation and configuration of the heated front screen control is identical to the heated rear window control, with the following exceptions:

• At 10°C (50°F) and above the timer will run for 3 minutes. Below 10°C (50°F) the timer will run for 17 minutes.

The timer values are stored in an EEPROM in the BC1.

Compressor Control

The Compressor is directly controlled by the EMS2000 through a compressor relay. When a request is received at the IHKS for compressor activation, a signal is sent to the BC1. The BC1 looks at blower status (output from the blower resistor pack) and evaporator temperature. If the blower is operational and the evaporator temperature is above 20°C (68°F), the BC1 changes the Compressor "OFF" signal it sends to the EMS2000 to a Compressor "ON" signal.

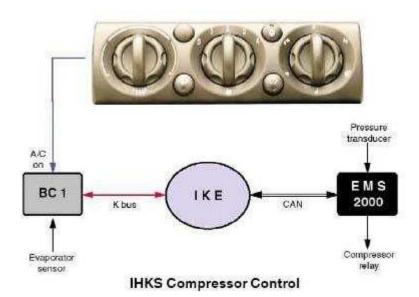


Fig. 29: IHKS Compressor Control Communication Diagram Courtesy of BMW OF NORTH AMERICA, INC.

The Compressor "ON" signal is sent via the K-Bus through the IKE over the CAN Bus to the EMS2000. When this "ON" signal is received by the EMS2000, it checks the status of the pressure transducer, and if the transducer is in operating range (1.6 - 30 Bar / 23 - 435 psi) the compressor clutch relay is energized.

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The BC1 is advised of the compressor activation (or no activation) and the illumination in the compressor request button of the IHKS remains illuminated. (No activation causes the LED to flash.)

Hard acceleration can cause the compressor clutch to be disengaged. After three occurrences in a single ignition cycle the EMS2000 disregards further hard acceleration occurrences and leaves the compressor clutch engaged.

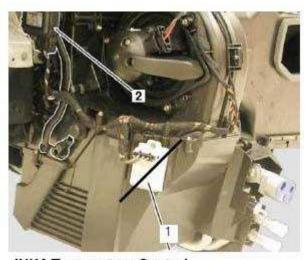
The air conditioning will be automatically suspended if:

- The engine speed is above 6016 rpm.
- The evaporator temperature falls below 2°C (36°F) to prevent freezing.
- The coolant temperature goes above 118°C (244°F)- to protect the engine.
- The AC system pressure goes above 30 Bar (435 psi) to protect the system.
- The AC system pressure goes below 1.6 Bar (23 psi)- to protect the system.
- The accelerator pedal is fully depressed (continuous full pedal demand) for more than 5 seconds.
- The accelerator pedal is depressed rapidly (instantaneous full pedal demand) for more than 2 seconds.
- The engine speed is below 500 rpm (engine stall).

IHKA HEATING AND AIR DISTRIBUTION

The Heating and Air Distribution of IHKA systems differ from the IHKS system in the following ways;

- Two servomotors controlled by the IHKA module operate the temperature blend flap and air distribution mechanism. Flap position is monitored by the IHKA using potentiometers integrated in the servomotors.
- A heater core sensor measures the temperature of the air coming off the heat exchanger. The sensor is located on the right side of the front of the heater unit.
- A rocker switch and a power transistor (final stage) controls the blower motor at eight speeds. The blower speed is controlled manually via the rocker switch or automatically in the AUTO mode.

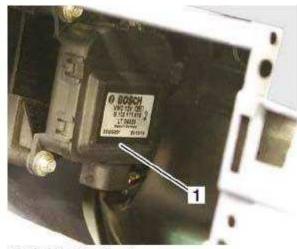


IHKA Temperature Control

- 1. Blower Transistor Pack (Final Stage)
- 2. Temperature Blend Flap Servo Motor

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Fig. 30: Blower Transistor Pack And Temperature Blend Flap Servo Motor Courtesy of BMW OF NORTH AMERICA, INC.



IHKA Air Distribution

1. IHKA Air Distribution Servo Motor

Fig. 31: IHKA Air Distribution Servo Motor Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Depending on production the date of the vehicle, the final stage unit (resistor pack) can be located as pictured above or on the blower motor assembly.

Switch Panel (IHKA)

An integral control panel on the IHKA module contains switches for system control inputs and a display to provide system status information.

The IHKA control system controls the operation of the refrigerant system and the control flaps in the heater assembly to control the temperature and distribution of air in the vehicle interior. It also outputs signals to the BC1 to control the fresh/re-circulation air servomotor and to the blower to control the air volume.

Display

The Display integrated into the IHKA will provide current temperature setting and fan speed information. The display will show LO or HI at the extreme temperature settings and indicate fan speed by the number of streamers illuminated around the fan blade. It is possible to display the temperature in 0C or 0F, changeable at the control unit

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IHKA Control Unit Display Minimum

<u>Fig. 32: IHKA Control Unit Display Minimum</u> Courtesy of BMW OF NORTH AMERICA, INC.



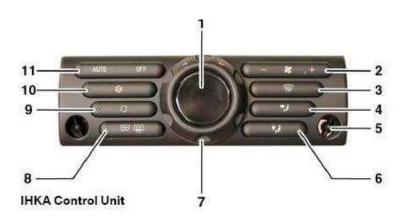
IHKA Control Unit Display 220C

<u>Fig. 33: IHKA Control Unit Display 220C</u> Courtesy of BMW OF NORTH AMERICA, INC.

Temperature Max Blower Speed

Blower Speed 3

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- 1. Display
- 2. Blower Switch
- 3. Defrost Switch
- 4. Face Distribution
- 5. Interior Temperature Sensor
- 6. Foot Distribution
- 7. Temperature Control Switch
- HFS/HRW Switch (Depending on option)
- 9. Fresh Air/Re-Circulation Switch
- 10. AC Compressor Switch
- 11. Auto/Off Switch

Fig. 34: IHKA Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

Blower Switch

The blower speed control is adjusted by a horizontal rocker switch, with + and - on the right and left respectively. This switch provides manual control of blower speed.

There are eight blower speeds. Each press of the blower switch will adjust the blower speed by one speed step in the appropriate direction. Pressing and holding the control will cause the fan speed to change every 0.8 seconds, until the control is released or the maximum or minimum speed is reached.

Blower speed will be indicated by a series of "streamer effect" bars arranged around the top edge of the central display panel. Each bar represents one speed step; eight bars are visible at maximum blower speed.

Blower speed will be controlled automatically if AUTO is selected. The blower will function 0.5 seconds after the end of cranking.

Defrost Switch (Programmed Defrost)

The programmed defrost mode is activated by briefly pressing the defrost switch. The LED in the switch flashing at 0.5 Hz signals this to the driver.

The programmed defrost can be switched off by pressing the switch again or pressing one of the other air distribution switches. Pressing the AUTO or OFF button also deactivates the defrost function.

To distribute air to the windshield without activating the defrost program requires a long press of the defrost switch (> 2 seconds).

Air Distribution Control

Manual control of the air distribution is provided by three switches which control the distribution of air to the face, foot and windshield outlets. Each switch has a green LED to indicate that it has been selected. Pressing one of the switches will illuminate the LED and open the selected air outlet.

Air distribution will be controlled automatically if AUTO is selected.

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Interior Temperature Sensor

The Interior Temperature Sensor is an encapsulated thermistor that provides the IHKA module with an input of passenger compartment air temperature. The sensor is installed in the right hand corner of the IHKA module and incorporates a fan to draw air from the vehicle interior over the sensor element.

Temperature Control Switch

The air temperature control is a rotary three-position switch, which is sprung to the center (rest) position. Rotating the control clockwise or anti-clockwise will increase or decrease respectively the desired temperature.

The rotary temperature control functions as follows:

- A momentary rotation increases or decreases the related temperature setting, in steps of 1°C (2°F), between 16 and 28°C (60 and 84°F).
- Switch held in the increase or decrease positions, step changes occur every 0.4 seconds until LO or HI is reached
- Switch rotated in the decrease position when a temperature of 16°C (60°F) is set, the display changes to LO (maximum cold).
- Switch rotated in the increase position when a temperature of 28°C (84°F) is set, the display changes to HI (maximum hot).

Pressing the AUTO button for longer than two seconds can change the unit of measurement (°C/°F).

Heated Rear Window (HRW)

A momentary push switch controls the heated rear window and incorporates an orange LED to indicate status. A single press of the switch will turn the heated rear window on, illuminate the LED, and start a timer. When the timer has expired, the heated rear window and LED will turn off. The HRW is controlled by the BC1.

Heated Windshield (HFS)

For the IHKA system the heated front screen shares the same control switch and LED as the heated rear window. The heated front screen operation is timed dependent on the outside temperature and controlled by the BC1

When the programmed defrost mode is requested with a short push on the defrost switch, all heated screens are switched on automatically. The LED will switch on only when the engine is running.

Workshop Hint

The Heated Rear Window Relay is attached to the back of the fusebox located near the A pillar.

This relay is integral with the fuse box and cannot be replaced separately.

Workshop Hint

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Neither Heated Window (Front or Rear) will operate unless the engine is running. If the engine is turned off while the Heating is active, Heating will be switched off.

Fresh Air/Recirculation Switch

The fresh/recirculation air control is a momentary push switch with a green LED to indicate status. A single press of the switch will close the fresh air intake and illuminate the recirculation LED. Another press of the switch while the LED is illuminated will open the fresh air intake and extinguish the LED.

Air recirculation will be controlled automatically if AUTO is selected. This may be overridden by pressing the air recirculation control. Recirculated air will then remain manually controlled until the air recirculation control is pressed again.

AC Switch

Provides manual on/off control of the refrigerant system compressor. The AC can be switched off to reduce fuel consumption when there is no requirement for cool or dehumidified air. The AC control is a momentary push switch with a green LED to indicate status. A single press of the switch will provide the AC function and illuminate the LED; another press of the switch will switch off the AC function and extinguish the LED. Air conditioning compressor is automatically switched on when the AUTO switch is pressed.

Auto/Off Switch

The automatic mode is activated with a single press of the AUTO switch; the green LED illuminating indicates this to the driver. The air distribution and blower speed is controlled automatically, and the air conditioning is switched on when AUTO is active.

The driver can over-ride the automatic mode of the air distribution or blower by pressing one of the distribution buttons or manually adjusting the blower speed. When the blower is being controlled in AUTO mode the blower speed bars and fan symbol are not displayed in the central display panel. In the automatic mode, if the temperature is set to LO or HI, the blower runs at maximum speed with correction only for vehicle speed.

The IHKA control panel may also be switched off by using the OFF horizontal rocker switch. This will switch off the blower and air conditioning, distribution control functions and temperature control will also be switched off.

Solar Sensor

The solar sensor consists of a light sensitive diode that provides the IHKA module with inputs of sunlight intensity. The input is used as a measure of the solar heating effect on vehicle occupants. The sensor is installed in the center of the upper dash.

Heater Core Temperature Sensor

The heater core temperature sensor is an encapsulated thermistor that provides the IHKA module with air temperature of the heater core. The sensor is installed in the right hand side heater housing.

IHKA Control System Principle of Operation

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IHKA Controls

On the IHKA system all functions have automatic and some manual modes of operation. The automatic modes provide optimum control of the system and require no manual intervention. The manual modes allow individual functions of automatic operation to be overridden, to accommodate personal preferences.

The IHKA control system controls the operation of the refrigerant system and the control flaps in the heater assembly to control the temperature and distribution of air in the vehicle interior. It also outputs signals to the BC1 to control the fresh/recirculation air servomotor and to the blower to control the air volume.

Temperature Control

The IHKA receives a temperature input from the Temperature Control Switch. Inputs from the Ambient Air Temp Sensor, Evaporator Temp Sensor, Interior Temp Sensor and Heater Core Air Temp Sensor are evaluated and a Target Temperature is set. The Target Temperature is the required temperature of the outlet air to achieve the requested temperature.

The IHKA module then signals the servomotor controlling the blend flap in the heater assembly to move the flap to the appropriate position. Feedback information is received by the IHKA from the blend flap servo motor to indicate flap position and confirm flap movement.

The target temperature is constantly updated and, in the automatic mode, also used in further calculations to determine the blower speed and the air distribution.

Blower Control

IHKA equipped vehicles have a blower final output stage in place of the resistor pack. The output stage is installed in the blower assembly.

NOTE: Resistor pack may be installed on early production vehicles on the A/C housing (driver's side).

In AUTO mode, the blower is automatically regulated. In the manual mode, 8 blower speeds are available. These correspond to approximately 20, 30, 40, 50, 60, 75, 90 and 100% of battery voltage.

The blower relay is energized by the BC1 whenever the ignition switch is in position 1 or 2, and the IHKA module modulates the output stage to regulate the voltage across the blower motor to control blower speed.

In the automatic blower and fresh air mode, the blower speed is corrected for vehicle speed to compensate for the increase in ram effect on the inlet air as the vehicle speed increases.

In the automatic mode, if the temperature is set to LO or HI, the blower runs at maximum speed with correction only for vehicle speed. When the temperature is set to a specific temperature, blower speed corrections are added to compensate for the heater coolant temperature, external air temperature, and the solar load on the vehicle:

• During warm-up, to avoid blowing excessive amounts of cold air into the passenger compartment, the blower speed is limited if the heater core air temperature is below approximately 60°C (140°F). A similar

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limitation is applied when the exterior temperature falls below -10°C (50°F).

- During cool down, to purge the ducting of hot air, blower speed is limited for a period of approximately 5 seconds after the system is switched on. The blower speed is then progressively increased over a period of approximately 10 seconds.
- As the temperature in the passenger compartment approaches the selected temperature, blower speed is progressively reduced until, once the selected temperature has been established, blower speed stabilizes.
- Solar heating correction is employed and progressively increases the blower speed with increasing values of solar heating.

Air Distribution

In automatic mode, to control air distribution within the passenger compartment, the IHKA module signals the servomotor controlling the distribution flap in the heater assembly to move the flap to the appropriate position. When a specific temperature selection is set, air distribution is determined from the target air outlet temperatures. For higher target air outlet temperatures, air distribution is set to footwell only. For lower target air outlet temperatures, air distribution is set to face level only. For intermediate target air outlet temperatures, air varies the bias between the footwell and the face level outlets, in three stages, to provide a gradual transition of air distribution from footwell only to face level only. Position and movement confirmation is received from a feedback potentiometer in the air distribution servo motor.

Fresh/Re-Circulation Air

The IHKA module outputs the required position of the fresh/re-circulated air flap to the BC1, which then operates the servo accordingly.

Air re-circulation will be controlled automatically if AUTO is selected. This may be overridden by pressing the air re-circulation control. Re-circulated air will then remain manually controlled until the air re-circulation control is pressed again.

Fresh or recirculated air is controlled by a flap, driven by a servomotor controlled by the BC1. The IHKA requests the position of the servomotor and flap by sending a K-Bus message indicating either fresh or recirculated air. The Body Control Module (BC1) responds with a K-Bus message that is used to switch the LED on/off. The fresh/recirculation servomotor is driven end to end, and then switched-off on a timer. No servo position feedback is available.

Programmed Defrost Function

The programmed defrost function is activated by a momentary push of the defrost switch. This function is only available when the engine is running,

0.5 seconds after cranking is completed. The programmed defrost functions as follows:

- AUTO mode off
- AC stays ON if ON before or OFF if OFF before.
- Fresh/recirculation function is set to fresh air mode.
- Desired temperature will be under manual control.

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- Air distribution will be set to DEFROST vents.
- Blower speed 8 selected (depending on battery level).
- Heated rear window and (heated front screen if fitted) is requested on.

The display will show the fan speed at MAX (8 bars), and the desired temperature. The defrost LED will flash at 0.5 Hz to indicate programmed defrost function is active. The programmed defrost function is not automatically recalled after ignition off.

The programmed defrost function is de-activated by the following actions:

- Brief press of the screen distribution switch will cancel the programmed defrost function. The control panel will return to its state prior to selection of programmed defrost.
- Foot or face air distribution mode switches will provide manual air mode operation with all other settings returning to their state prior to selection of programmed defrost and cancel the programmed defrost mode.
- A press of the AUTO switch will restore auto operation of the panel and cancels programmed defrost mode.
- A press of the OFF button will switch the panel off. A subsequent press of the OFF button will switch on the panel and restore the programmed defrost function.
- A long push (>2 second) of the defrost switch will provide manual screen distribution and cancel programmed defrost mode.

Heated Front and Rear Windows (HFS/HRW)

Operation of the Heated Front and Rear Windows is the same in the IHKA system as in the IHKS system.

Compressor Control

The control of the compressor is the same as that of the IHKS with the exception of the IHKA module signals compressor request to the EMS2000 via the K-bus and not the BC1. The evaporator sensor still signals to the BC1 as on the IHKS.

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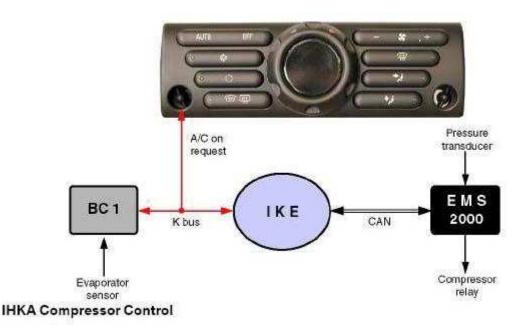


Fig. 35: IHKA Compressor Control Communication Diagram Courtesy of BMW OF NORTH AMERICA, INC.

Compressor Cut-out Criteria

For both versions of air conditioning the following conditions will suspend the operation of the compressor:

- Full-load acceleration
- Engine coolant temperature > 118°C (244°F)
- Engine speed > 6016 rpm
- Engine speed < 500 rpm
- Evaporator temperature < 2°C (36°F)
- Refrigerant pressure < 1.6 bar / > 30 bar (23 435 psi)

IHKA On Board Diagnosis

The on board diagnostics function is a special feature of the IHKA that provides three test modes:

- Mode 1 Read fault memory
- Mode 2 Calibration run
- Mode 3 Manual check of functions

To access the on board diagnosis function the OFF button and the blower PLUS switch must be pressed simultaneously for approximately two seconds with the ignition in position 2. The central display panel will show a single "streamer bar" to represent mode 1 - Read fault memory. To access mode 1 the AUTO button must be pressed.

To select mode 2 or 3 it is necessary to press the OFF button, the second or third streamer bar illuminating will

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indicate the relevant mode to the Technician depending on how many times the OFF button is pressed. To access the mode the AUTO button must be pressed.

To exit the on board diagnosis mode the ignition must be switched to the off position.

Mode 1: Read Fault Memory

The IHKA fault memory is read and displayed in the central display panel. If no faults are present 00 is displayed and if a fault is stored FF followed by a code number is displayed. This display flashes at 0.5 Hz.

Mode 2: Calibration Run

The objective of the calibration procedure is to correct the position drift of the servomotors for temperature and air distribution control. During a calibration run:

- Both servomotors are driven to their two end positions and the new values stored in the IHKA EEPROM.
- All LED's activated simultaneously.
- Blower streamer bars individually illuminated.
- CA flashes in the central display panel at 0.5 Hz.

IHKA FAULT CODES

Code	Description
01	Solar sensor fault
02	Interior temperature sensor fault
03	Heater core temperature sensor fault
04	Air distribution servomotor feedback fault
05	Blend flap servomotor feedback fault
06	Blower switch minus fault
07	Blower switch plus fault
08	Interior sensor fan fault
09	Air distribution servomotor fault
10	Blend flap servomotor fault

There are three possible operating statuses shown in the central display:

- CA = Calibration Active
- CC = Calibration Complete
- FF = Fault

Mode 3: Manual Mode

In this mode blower, air distribution, recirculation, heated screens, air conditioning ON/OFF and temperature are manually controlled.

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2007 HVAC

Heating and Air Conditioning - Technical Data - Cooper

51 AC HOUSING-EVAPORATOR

64 51 AIR CONDITIONER (EVAPORATOR), SHIFT ELEMENTS

AIR CONDITIONER (EVAPORATOR), SHIFT ELEMENTS - TECHNICAL DATA

Resistance depending on temperature	°C/kohms	-5/11.4 11.9 0/8.8 9.2 5/6.8 7.2 10/5.3 5.6 15/4.2 4.5 20/3.3 3.6 25/2.6 2.9 30/2.1 2.3 35/1.7 1.9
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64 51 AIR CONDITIONER (EXPANSION VALVE), SHIFT ELEMENTS

AIR CONDITIONER (EXPANSION VALVE), SHIFT ELEMENTS - TECHNICAL DATA

Inlet pressure	bar	14
Outlet pressure	bar	1.8
Leak test with detector at pressure of	bar	1 2

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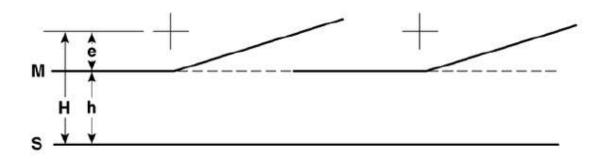
2007 ACCESSORIES AND BODY, CAB

Lights - Repair Instructions - Cooper

10 LAMP SETTINGS

63 10 ... TEST REQUIREMENTS FOR HEADLIGHT VERTICAL AIM ADJUSTMENT

- Car parked on level ground.
- Replace faulty glass and mirrors and blackened light bulbs.
- Check tire pressure and correct if necessary.
- Apply load equivalent to one person on driver's seat (approx. 75 kg).
- Vehicle with full fuel tank or appropriate additional weight in luggage compartment.
- Correct adjustment of headlights in relation to engine hood (gap dimensions).
- Manual headlight vertical aim control: Turn handwheel to 0 position.
- Automatic headlight vertical aim control: Wait approx. 30 seconds after switching on lights.
- Version with xenon headlights: Wait 80 seconds after switching on lights. During this time, do not move the vehicle and avoid vibrations.
- Align headlight aimer with vehicle longitudinal axis and parallel to parking surface. Set marking line (M) on aimer to distance (e). Scale graduations on aimer are equal to a gradient in cm at a distance of 10 meters.



30 63 067

Fig. 1: Aligning Headlight Aimer With Vehicle Longitudinal Courtesy of BMW OF NORTH AMERICA, INC.

Light/dark limit of headlights in headlight aimer

e Adjustment dimension, headlights:

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o as per type plate on headlight housing in % (e.g.: 1.0 % = 10 cm / 10 m = 10 on headlight aimer).

Adjustment dimension, fog lights:

o all vehicles 2.0 % = 20 cm / 10 m = 20 on headlight aimer.

H Height of center of headlight above parking surface.

h H - e = height of marking line above parking surface

+ Central mark = center point of high-beam headlight.

M Marking line of headlamp aimer

S Parking surface of vehicle and headlight aimer

Adjustment dimension (e) is only valid for EUR. Observe differing national regulations.

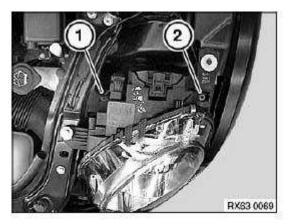
63 10 004 ADJUSTING HEADLIGHTS

NOTE: Comply with test preconditions for headlight adjustment.

Adjust headlights at adjusting screws (1) and (2).

A definite allocation of adjusting screws is not possible.

- 1. Adjustment screw primarily for vertical adjustment
- 2. Adjustment screw primarily for lateral adjustment



<u>Fig. 2: Identifying Headlights Adjusting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 10 014 ADJUSTING FOG LAMPS

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Necessary preliminary tasks:

• Observe test preconditions for adjusting headlights

Carry out height adjustment of fog lamp at adjusting screw (1).

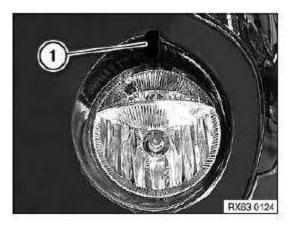


Fig. 3: Identifying Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

12 HEADLIGHTS

63 12 007 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HEADLIGHT (HALOGEN HEADLIGHT)

WARNING: Follow instructions for handling light bulbs (exterior lights).

Release screws (1).

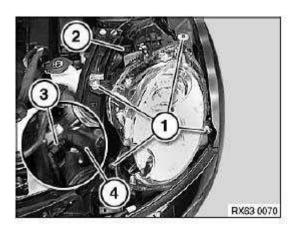
Disconnect plug connection (2).

Version with headlight washer system:

• Pull headlight forwards slightly and detach hose connection (3) from high-pressure nozzle (4).

Remove headlight.

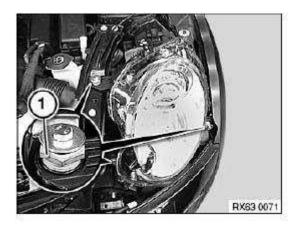
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<u>Fig. 4: Identifying Screws And High-Pressure Nozzle</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Adjust gap dimensions by means of adjusting screws (1)
- Adjust headlights



<u>Fig. 5: Identifying Adjusting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Modify halogen bulb for headlight
- Modify halogen bulb for high-beam headlight
- Modify bulb for direction indicator
- If necessary, modify high-pressure nozzle of headlight washer system
- Modify adjusting screws

63 12 010 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT (XENON HEADLIGHT)

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WARNING: Version with xenon headlight: Danger to life due to high voltage!

Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off).

Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Follow instructions for handling light bulbs (exterior lights).

Release screws (1).

Disconnect plug connection (2).

Pull headlight forwards slightly and detach hose connection (3) from high-pressure nozzle (4).

Remove headlight.

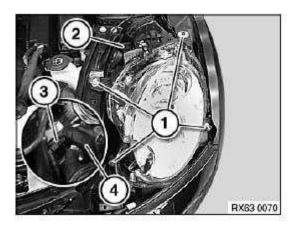
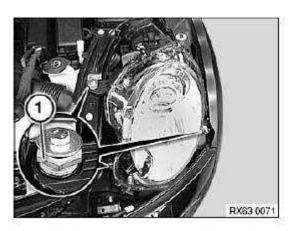


Fig. 6: Identifying Screws And High-Pressure Nozzle Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Adjust gap dimensions by means of adjusting screws (1)
- Adjust headlights

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<u>Fig. 7: Identifying Adjusting Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Modify xenon bulb for headlight
- Modify bulb for direction indicator
- Modify control unit for xenon headlights
- Modify high-pressure nozzle of headlight washer system
- Modify adjusting screws

63 12 012 REMOVING AND INSTALLING RIGHT HEADLIGHT (XENON HEADLIGHT)

NOTE: Operation is described in <u>63 12 010 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT (XENON HEADLIGHT)</u>.

63 12 860 REPLACING CONTROL UNIT FOR LEFT XENON HEADLIGHT

WARNING: Version with xenon headlight: Danger to life due to high voltage!

Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off).

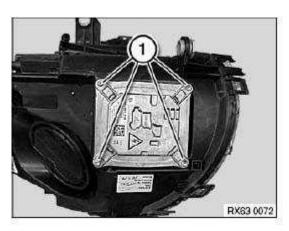
Work on the entire xenon lighting system (control unit, ignition unit with bulb) may only be carried out by specialist personnel.

Necessary preliminary tasks:

• Remove headlight

Release screws (1) and fold down control unit.

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<u>Fig. 8: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove control unit (2).

Installation:

Make sure cup seal (3) is correctly seated on xenon headlight.

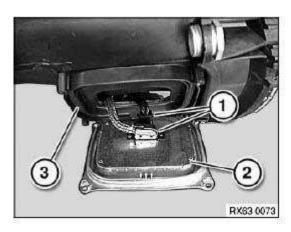


Fig. 9: Identifying Plug Connection And Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

63 12 861 REPLACING CONTROL UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in 63 12 860 REPLACING CONTROL UNIT FOR LEFT XENON HEADLIGHT.

63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT (WITH XENON BULB)

WARNING: Version with xenon headlights: Danger to life due to high voltage!

Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off).

Work on the entire xenon lighting system (control unit, ignition unit with

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bulb) may only be carried out by specialist personnel. Follow instructions for handling light bulbs (exterior lights).

IMPORTANT: Ignition unit and xenon bulb are viewed as a single component and must not be separated!

Unlock retaining tab (1) and remove cover (2) from headlight.

Installation:

Make sure cover (2) is correctly seated on headlight.

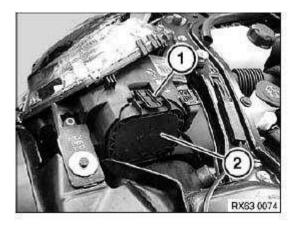


Fig. 10: Identifying Retaining Tab And Cover Courtesy of BMW OF NORTH AMERICA, INC.

Unlock spring wire clips (1).

Disconnect plug connection (2).

Remove ignition unit for xenon headlight (3) from headlight.

Installation:

Make sure ignition unit (3) is exactly seated in headlight.

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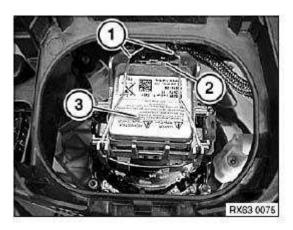


Fig. 11: Identifying Spring Wire Clips And Xenon Headlight Courtesy of BMW OF NORTH AMERICA, INC.

63 12 871 REPLACING RIGHT IGNITION UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in 63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT (WITH XENON BULB).

13 TURN SIGNAL INDICATOR

63 13 200 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT AUXILIARY TURN SIGNAL LAMP

Carefully lever out trim containing auxiliary turn signal light in front area (1) and slide towards front (2).

Remove trim containing auxiliary turn signal light from side wing.

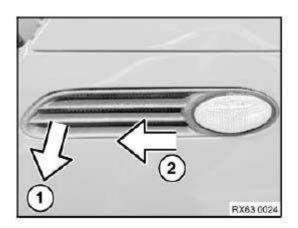


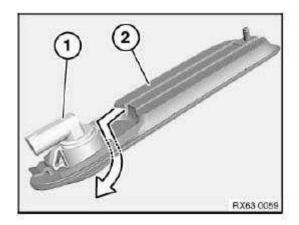
Fig. 12: Identifying Turn Signal Light
Courtesy of BMW OF NORTH AMERICA, INC.

Slide auxiliary turn signal lamp (1) towards rear and fold in direction of arrow out of trim (2).

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Replacement:

• Replace bulb



<u>Fig. 13: Identifying Auxiliary Turn Signal Lamp</u> Courtesy of BMW OF NORTH AMERICA, INC.

17 FOG LIGHTS, AUXILIARY

63 17 070 REMOVING AND INSTALLING/REPLACING LEFT FOG LAMP INSERT

Necessary preliminary tasks:

• Remove front bumper trim

Release screws (1) and remove fog lamp insert (2).

Replacement:

Adjust front fog lamps.

The time value for this work operation does not include adjustment!

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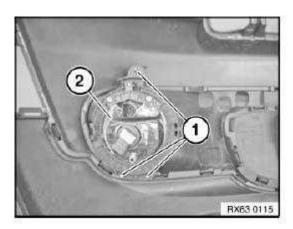


Fig. 14: Identifying Screws And Fog Lamp Courtesy of BMW OF NORTH AMERICA, INC.

63 17 075 REMOVING AND INSTALLING/REPLACING RIGHT FOG LAMP INSERT

Necessary preliminary tasks:

- Partially detach front wheel arch liner
- Release fanfare horn

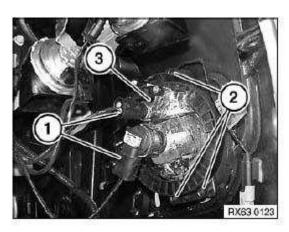
Disconnect plug connection (1).

Release screws (2) and remove fog lamp insert (3).

Replacement:

Adjust front fog lamps.

The time value for this work operation does not include adjustment!



<u>Fig. 15: Identifying Plug Connection And Fog Lamp Insert</u> Courtesy of BMW OF NORTH AMERICA, INC.

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63 17 090 REMOVING AND INSTALLING/REPLACING LEFT POSITION LIGHT

Necessary preliminary tasks:

• Remove front bumper trim

Release screws (1) and remove position light (2).

Replacement:

• Replace bulb

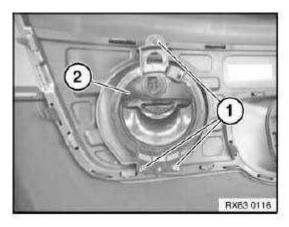


Fig. 16: Identifying Screws And Position Light Courtesy of BMW OF NORTH AMERICA, INC.

63 17 092 REMOVING AND INSTALLING/REPLACING RIGHT POSITION LIGHT

Necessary preliminary tasks:

- Partially detach front wheel arch liner
- Release fanfare horn

Disconnect plug connection (1).

Release screws (2) and remove position light.

Replacement:

• Replace bulb

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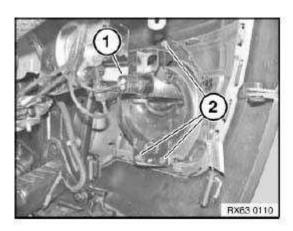


Fig. 17: Identifying Plug Connection And Screws Courtesy of BMW OF NORTH AMERICA, INC.

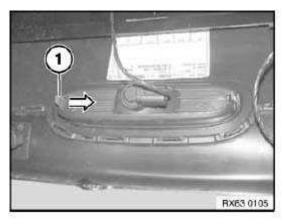
63 24 010 REMOVING AND INSTALLING/REPLACING REAR FOG LIGHT

Unlock retaining tabs (1) and simultaneously press rear fog light outwards.

Disconnect plug connection and remove rear fog light.

Replacement:

• Replace bulb for rear fog light



<u>Fig. 18: Identifying Retaining Tabs</u> Courtesy of BMW OF NORTH AMERICA, INC.

21 REAR LIGHT CLUSTER

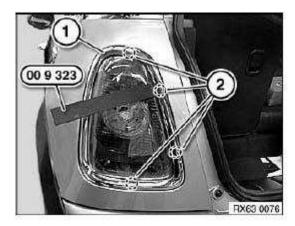
51 13 425 REMOVING AND INSTALLING/REPLACING TRIM ON LEFT OR RIGHT REAR LIGHT

Special tools required:

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• 00 9 323

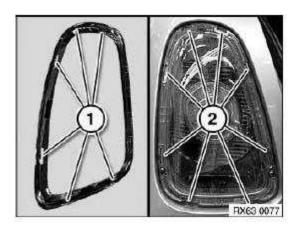
Unclip trim (1) with special tool 00 9 323 at points (2).



<u>Fig. 19: Identifying Trim With Special Tool (00 9 323)</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining tabs (1) and retaining catches (2) must not be damaged.

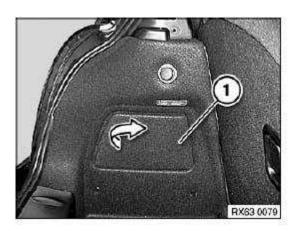


<u>Fig. 20: Identifying Retaining Tabs And Retaining Catches</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 21 055 REPLACING A SOCKET HOUSING FOR LEFT OR RIGHT REAR LIGHT

Remove cover (1).

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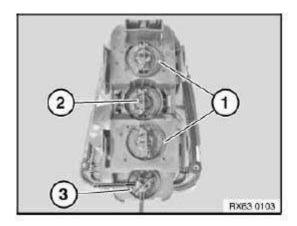


<u>Fig. 21: Identifying Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rear light (2) removed for purposes of clarity.

Turn socket housings (1-3) in counterclockwise direction and pull out of rear light.

- 1. Socket housing, rear light/brake light
- 2. Socket housing, direction indicator
- 3. Socket housing, reversing light



<u>Fig. 22: Identifying Light And Socket Housings</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 21 180 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR LIGHT

Necessary preliminary tasks:

• Remove trim on rear light

Release bolts (1). Tightening torque 63 21 2AZ.

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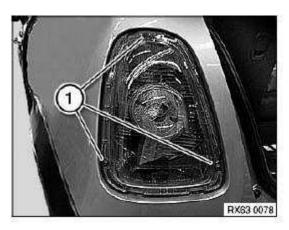


Fig. 23: Identifying Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover (1) in direction of arrow.



Fig. 24: Identifying Cover Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Sectional view for improved clarity.

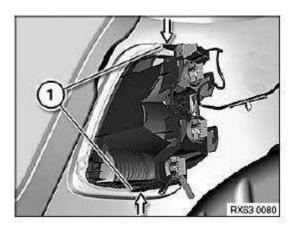
Unlock retaining tabs (1) from inside.

Remove rear light outwards and disconnect plug connection.

Replacement:

If necessary, remove bulbs.

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<u>Fig. 25: Identifying Retaining Tabs</u> Courtesy of BMW OF NORTH AMERICA, INC.

25 BRAKE LIGHTS

63 25 000 REMOVING AND INSTALLING/REPLACING AUXILIARY BRAKE LIGHT

Necessary preliminary tasks:

• Partially detach trim for rear window frame at top

Disconnect plug connection (1).

Release screws (2) and remove light unit (3).

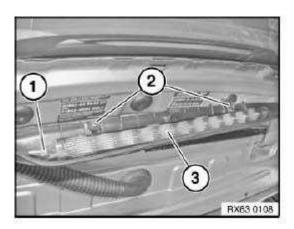


Fig. 26: Identifying Plug Connection And Light Unit Courtesy of BMW OF NORTH AMERICA, INC.

31 INTERIOR LIGHTS

61 31 029 REMOVING AND INSTALLING/REPLACING ROOF OPERATING UNIT

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IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

Lever trim (1) off roof operating unit.

If necessary, disconnect microphone plug connection and remove trim (1).

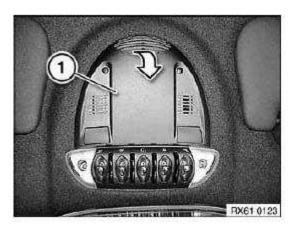


Fig. 27: Removing Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

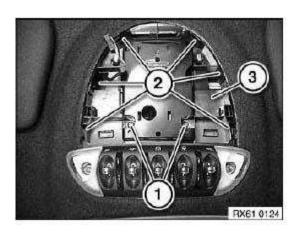
Unlock catches (2).

Lower roof operating unit (3).

Disconnect associated plug connections and remove roof operating unit (3).

Replacement:

If necessary, remove bulbs.



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Fig. 28: Identifying Catches And Roof Operating Unit Courtesy of BMW OF NORTH AMERICA, INC.

63 31 .. OVERVIEW OF INTERIOR LIGHTS

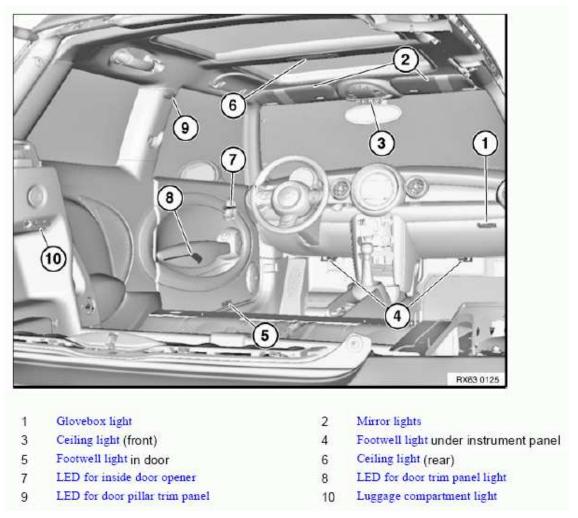


Fig. 29: Overview Of Interior Lights Components Courtesy of BMW OF NORTH AMERICA, INC.

63 31 003 REMOVING AND INSTALLING/REPLACING COMPLETE CEILING LIGHT (REAR)

IMPORTANT: Follow instructions for handling light bulbs (interior lights).

Lever out ceiling light (1) in direction of arrow.

Installation:

Make sure ceiling light (1) is correctly engaged on body.

Disconnect associated plug connection and remove ceiling light (1).

2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

Replacement:

If necessary, remove bulbs.



Fig. 30: Identifying Ceiling Light
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 020 REMOVING AND INSTALLING/REPLACING FOOTWELL LIGHT

IMPORTANT: Follow instructions for handling light bulbs (interior lights).

Lever out footwell light (1) in direction of arrow.

Disconnect associated plug connection and remove footwell light (1).

Replacement:

- If necessary, remove bulb.
- Note bulb type.

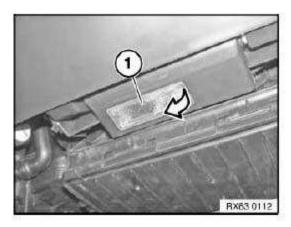


Fig. 31: Identifying Footwell Light Courtesy of BMW OF NORTH AMERICA, INC.

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63 31 020 REMOVING AND INSTALLING/REPLACING FOOTWELL LIGHT (UNDERSIDE OF DOOR AT FRONT)

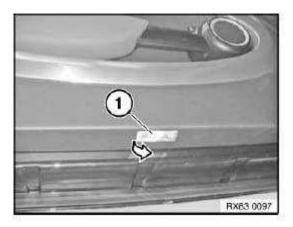
IMPORTANT: Follow instructions for handling light bulbs (interior lights).

Lever footwell light (1) in direction of arrow out of door trim panel.

Disconnect associated plug connection and remove footwell light (1).

Replacement:

If necessary, remove bulb.



<u>Fig. 32: Identifying Footwell Light</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 31 068 REMOVING AND INSTALLING/REPLACING SWITCH FOR PASSENGER AIRBAG DEACTIVATION

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove side cover from cover for air outlet vent on right

Disconnect plug connection.

Press catch (1) and press out switch for passenger airbag deactivation (2) in direction of arrow.

Installation:

Make sure switch for front passenger airbag deactivation (2) is installed in correct position.

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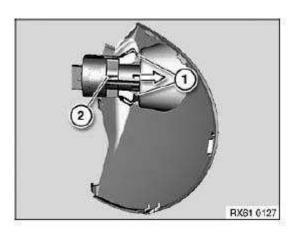


Fig. 33: Identifying Catch And Passenger Airbag Deactivation Courtesy of BMW OF NORTH AMERICA, INC.

63 31 080 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT LIGHT

IMPORTANT: Follow instructions for handling light bulbs (interior lights).

Lever out luggage compartment light (1) in direction of arrow.

Disconnect associated plug connection and remove luggage compartment light (1).

Replacement:

- If necessary, remove bulb.
- Note bulb type.

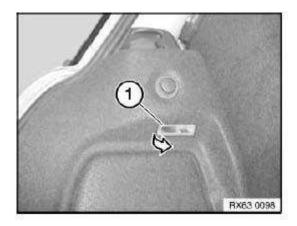


Fig. 34: Identifying Luggage Compartment Light Courtesy of BMW OF NORTH AMERICA, INC.

63 31 150 REMOVING AND INSTALLING/REPLACING GLOVEBOX LIGHT

IMPORTANT: Follow instructions for replacing light bulbs (interior lights).

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Open glovebox.

Lever out glovebox light (1) in direction of arrow.

Disconnect plug connection and remove glovebox light (1).

Replacement:

- Remove bulb
- Note bulb type

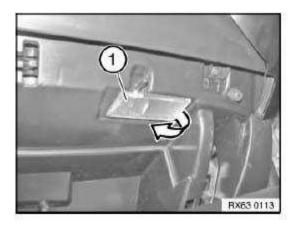


Fig. 35: Identifying Glovebox Light
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 180 REPLACING LED FOR FRONT DOOR TRIM PANEL LIGHT

Necessary preliminary tasks:

• Remove armrest from front door trim panel

Disconnect plug connection (1).

Detach LED for side trim panel light (2) in direction of arrow from fibre optic cable (3).

Installation:

LED for side trim panel light (2) must be felt to snap into place in fibre optic cable (3).

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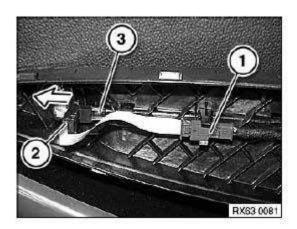


Fig. 36: Identifying Plug Connection And Side Trim Panel Light Courtesy of BMW OF NORTH AMERICA, INC.

63 31 182 REPLACING LED FOR FRONT INSIDE DOOR OPENER

Necessary preliminary tasks:

- Remove front door trim panel carrier
- Remove inside door opener in front door.

Unlock LED for door opener (1) in opening (2) and pull out of door opener (3).

Installation:

LED for side trim panel light (1) must be felt to snap into place in door opener (3).

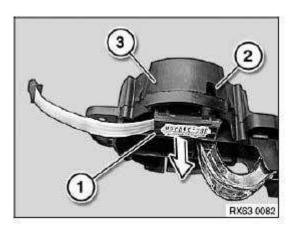


Fig. 37: Identifying Side Trim Panel Light Courtesy of BMW OF NORTH AMERICA, INC.

63 31 187 REMOVING AND INSTALLING/REPLACING LED FOR LEFT OR RIGHT DOOR PILLAR PANEL

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Necessary preliminary tasks:

• Remove upper door pillar panel

Disconnect plug connection (1).

Pull out LED for door pillar panel (2) in direction of arrow.

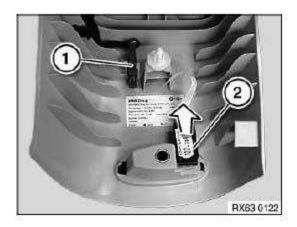


Fig. 38: Identifying Plug Connection And Door Pillar Panel Courtesy of BMW OF NORTH AMERICA, INC.

99 LIGHT BULBS

63 31 .. OVERVIEW OF INTERIOR LIGHTS

2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

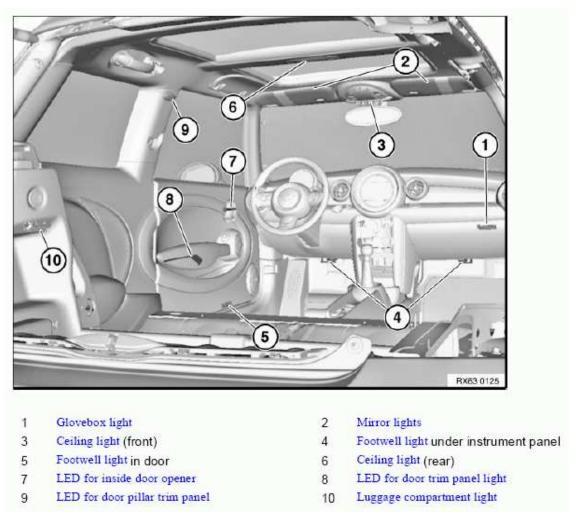


Fig. 39: Overview Of Interior Lights Components Courtesy of BMW OF NORTH AMERICA, INC.

63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)

WARNING: Xenon headlights: Danger to life due to high voltage!

Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

WARNING: Halogen lamps are under pressure:

To avoid injury, wear protective goggles and gloves.

IMPORTANT: To prevent short-circuiting, disconnect light bulbs from voltage supply prior to replacement.

Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99 ... INSTRUCTIONS FOR REPLACING LIGHT BULBS (INTERIOR LIGHTS)

CAUTION: To prevent short-circuiting, disconnect light bulbs from voltage supply prior to replacement.

Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99 ... REPLACING BULB FOR ROOF OPERATING UNIT

WARNING: Follow instructions for handling light bulbs (interior lights).

Lever trim (1) off roof operating unit (2).

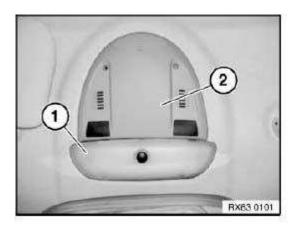
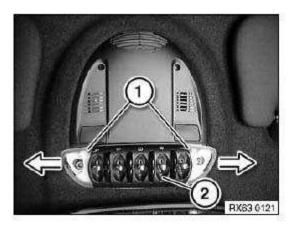


Fig. 40: Identifying Trim Roof Operating Unit Courtesy of BMW OF NORTH AMERICA, INC.

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Optional extra - Light package:

Lever trim (1) off roof operating unit (2).



<u>Fig. 41: Identifying Trim Roof Operating Unit</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reflector must not be damaged.

Pull out bulb (1) in direction of arrow.

Installation:

Note type of bulb.

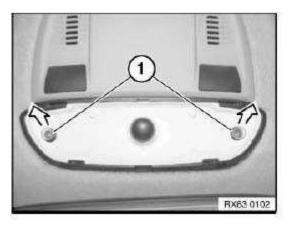


Fig. 42: Identifying Bulb Courtesy of BMW OF NORTH AMERICA, INC.

63 99 002 REPLACING HALOGEN BULB FOR LEFT OR RIGHT HIGH-BEAM HEADLIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights).

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Unlock retaining tab (1) and remove cover (2) from headlight.

Installation:

Make sure cover (2) is correctly seated on headlight.

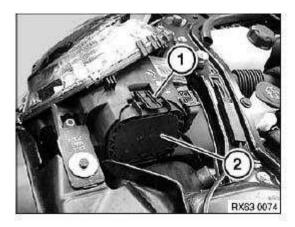


Fig. 43: Identifying Retaining Tab And Cover Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1) and pull halogen bulb for high-beam headlight (2) out of headlight.

Disconnect plug connection (3) and remove halogen bulb for high-beam headlight (2).

Installation:

Make sure halogen bulb for high-beam headlight (2) is correctly seated.

Note type of bulb.



Fig. 44: Identifying Plug Connection And High-Beam Headlight Courtesy of BMW OF NORTH AMERICA, INC.

63 99 072 REPLACING HALOGEN-LIGHT BULB FOR LEFT OR RIGHT HEADLIGHT

2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

WARNING: Follow instructions for handling light bulbs (exterior lights).

Unlock retaining tab (1) and remove cover (2) from headlight.

Installation:

Make sure cover (2) is correctly seated on headlight.

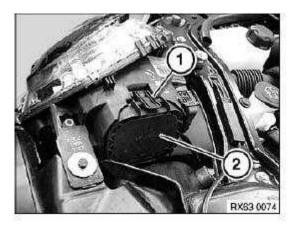


Fig. 45: Identifying Retaining Tab And Cover Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1) and pull halogen bulb for headlight (2) out of headlight.

Disconnect plug connection (3) and remove halogen bulb for headlight (2).

Installation:

Make sure halogen bulb for headlight (2) is correctly seated.

Note type of bulb.



2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

Fig. 46: Identifying Plug Connection And High-Beam Headlight Courtesy of BMW OF NORTH AMERICA, INC.

63 99 076 REPLACING BULB FOR LEFT (OR RIGHT) XENON HEADLIGHT (WITH IGNITION UNIT)

Operation is described in <u>63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT</u> (WITH XENON BULB).

63 99 201 REPLACING HALOGEN BULB FOR LEFT OR RIGHT FRONT FOG LAMP

WARNING: Follow instructions for handling light bulbs (exterior lights).

Turn cover (1) in direction of arrow and remove.

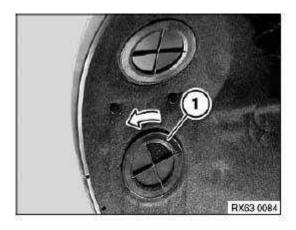


Fig. 47: Locating Cover Courtesy of BMW OF NORTH AMERICA, INC.

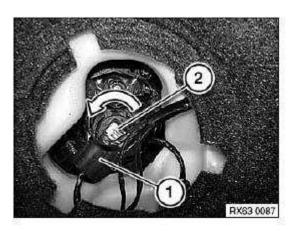
Disconnect plug connection (1).

Turn bulb (2) in direction of arrow and remove from fog lamp.

Installation:

Note type of bulb.

2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

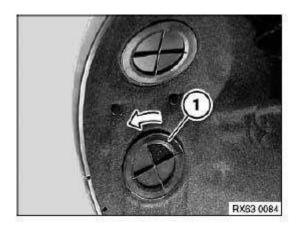


<u>Fig. 48: Identifying Plug Connection And Bulb</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 99 225 REPLACING BULB FOR FRONT LEFT OR RIGHT POSITION LIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights).

Turn cover (1) in direction of arrow and remove.

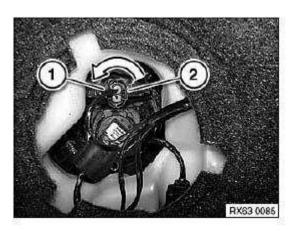


<u>Fig. 49: Locating Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb holder (1) in direction of arrow and pull out of light.

Disconnect plug connection (2).

2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

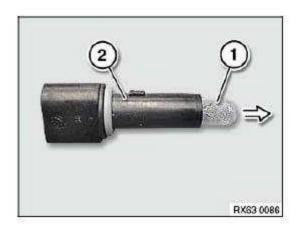


<u>Fig. 50: Identifying Bulb Holder And Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove bulb for position light (1) out of bulb holder (2).

Installation:

Note type of bulb.



<u>Fig. 51: Identifying Bulb And Bulb Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 99 273 REPLACING BULB FOR LEFT (OR RIGHT) FRONT TURN INDICATOR

WARNING: Follow instructions for handling light bulbs (exterior lights).

Turn cover (1) in direction of arrow and remove.

2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

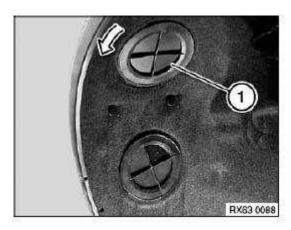


Fig. 52: Identifying Cover Courtesy of BMW OF NORTH AMERICA, INC.

Turn cap (1) in direction of arrow (2) and remove.

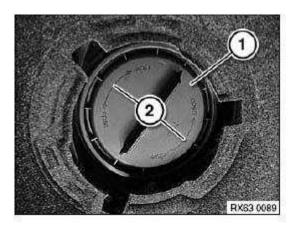
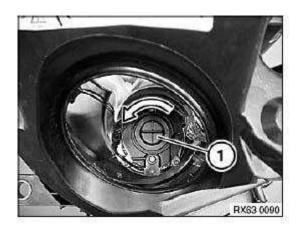


Fig. 53: Identifying Cap Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb holder (1) in direction of arrow and pull out.



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Fig. 54: Turning Bulb Holder Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bulb for front direction indicator (1) from bulb holder (2).

Installation:

Note type of bulb.

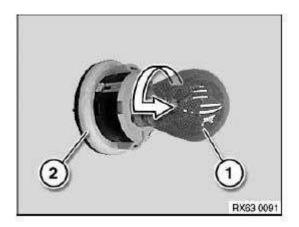


Fig. 55: Identifying Front Direction Indicator Bulb Courtesy of BMW OF NORTH AMERICA, INC.

63 99 295 REPLACING BULB FOR LEFT OR RIGHT AUXILIARY DIRECTION INDICATOR

WARNING: Follow instructions for handling light bulbs (exterior lights).

Carefully lever out trim containing auxiliary direction indicator (1) in front area and slide towards front.

Remove trim containing auxiliary direction indicator (1) from side panel.



Fig. 56: Identifying Auxiliary Direction Indicator

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Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb holder (1) counterclockwise and remove trim containing auxiliary direction indicator (2).

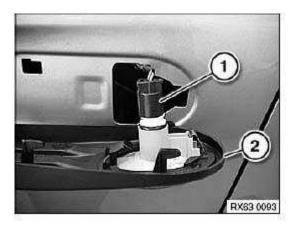


Fig. 57: Identifying Bulb Holder And Auxiliary Direction Indicator Courtesy of BMW OF NORTH AMERICA, INC.

Pull bulb for auxiliary direction indicator (1) out of bulb holder (2).

Installation:

Make sure sealing ring (3) is correctly seated.

Note type of bulb.

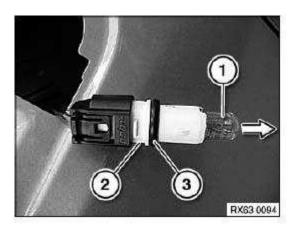


Fig. 58: Identifying Auxiliary Direction Indicator And Sealing Ring Courtesy of BMW OF NORTH AMERICA, INC.

63 99 315 REPLACING LIGHT BULB(S) FOR LEFT OR RIGHT REAR LIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights).

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Remove cover (1) from luggage compartment wheel arch trim.

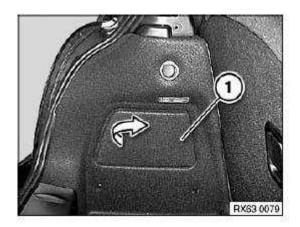


Fig. 59: Identifying Cover Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rear light (2) removed for purposes of clarity.

Turn socket housings (1-3) and pull out of rear light.

- 1. Socket housing, rear light/brake light
- 2. Socket housing, direction indicator
- 3. Socket housing, reversing light

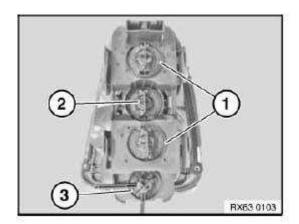


Fig. 60: Identifying Light And Socket Housings Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb (1) in direction of arrow and pull out of socket housing (2).

Installation:

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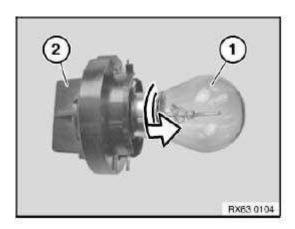


Fig. 61: Turning Bulb Courtesy of BMW OF NORTH AMERICA, INC.

63 99 401 REPLACING BULB FOR LEFT OR RIGHT LICENSE PLATE LIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights).

Remove lens (1) in direction of arrow.

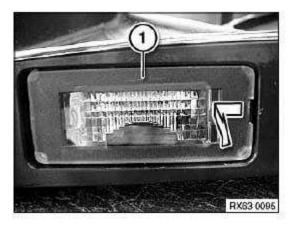
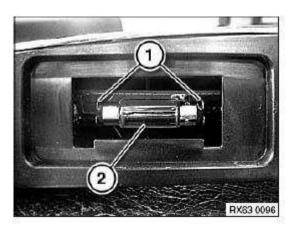


Fig. 62: Identifying Lens Courtesy of BMW OF NORTH AMERICA, INC.

Spread bow contacts (1) and remove festoon bulb (2).

Installation:

2007 ACCESSORIES AND BODY, CAB Lights - Repair Instructions - Cooper

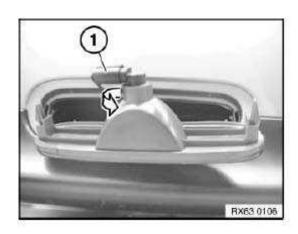


<u>Fig. 63: Identifying Spread Bow Contacts And Festoon Bulb</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 99 401 REPLACING BULB FOR REAR FOG LIGHT

WARNING: Follow instructions for handling light bulbs (exterior lights).

Turn bulb holder (1) in counterclockwise direction and remove from rear fog light.

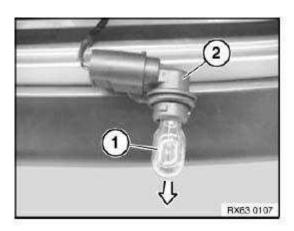


<u>Fig. 64: Identifying Bulb Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pull bulb (1) out of bulb holder (2).

Installation:

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<u>Fig. 65: Identifying Bulb Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

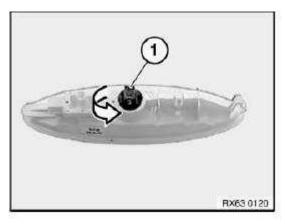
63 99 432 REPLACING LIGHT BULB(S) FOR CEILING LIGHT (REAR)

WARNING: Follow instructions for handling light bulbs (interior lights).

Necessary preliminary tasks:

• Remove rear ceiling light

Turn bulb holder (1) in direction of arrow and pull out.



<u>Fig. 66: Turning Bulb Holder</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove bulb (1) from bulb holder (2) in direction of arrow.

Installation:

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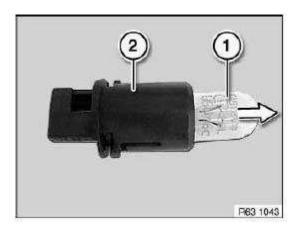


Fig. 67: Identifying Bulb And Bulb Holder Courtesy of BMW OF NORTH AMERICA, INC.

63 99 437 REPLACING BULB FOR FOOTWELL LIGHT (ON UNDERSIDE OF DOOR AT FRONT)

WARNING: Follow instructions for handling light bulbs (interior lights).

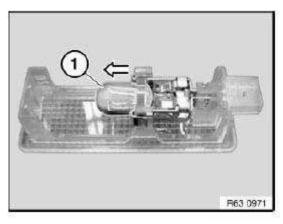
Necessary preliminary tasks:

• Remove footwell light

Pull bulb (1) in direction of arrow out of bulb holder.

Installation:

Note type of bulb.



<u>Fig. 68: Pulling Bulb</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 99 437 REPLACING LIGHT BULB FOR FOOTWELL LIGHT

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WARNING: Follow instructions for handling light bulbs (interior lights).

Necessary preliminary tasks:

• Remove footwell light

Pull bulb (1) in direction of arrow out of bulb holder.

Installation:

Note type of bulb.

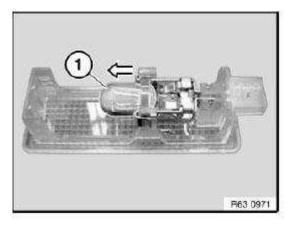


Fig. 69: Pulling Bulb Courtesy of BMW OF NORTH AMERICA, INC.

63 99 445 REPLACING BULB FOR MIRROR LIGHT

WARNING: Follow instructions for handling light bulbs (interior lights).

Unclip mirror at points (1) and remove.

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<u>Fig. 70: Identifying Mirror Clip Points</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pull out bulbs (1) in direction of arrow.

Installation:

Note type of bulb.



<u>Fig. 71: Pulling Bulbs</u> Courtesy of BMW OF NORTH AMERICA, INC.

63 99 451 REPLACING LIGHT BULB FOR LUGGAGE COMPARTMENT LIGHTING

WARNING: Follow instructions for handling light bulbs (interior lights).

Necessary preliminary tasks:

• Remove luggage compartment light

Pull bulb (1) in direction of arrow from bulb holder.

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Installation:

Note type of bulb.

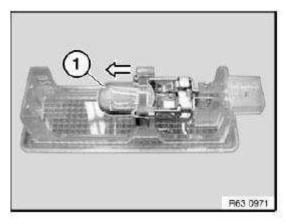


Fig. 72: Pulling Bulb Courtesy of BMW OF NORTH AMERICA, INC.

63 99 461 REPLACING BULB FOR GLOVEBOX LIGHT

WARNING: Follow instructions for handling light bulbs (interior lights).

Necessary preliminary tasks:

• Remove glovebox light

Spread bow contacts (1) and remove bulb.

Installation:

Note bulb type.

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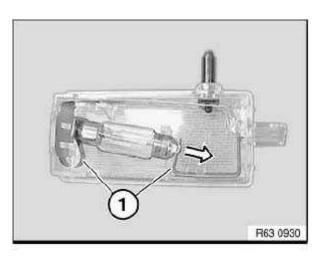


Fig. 73: Identifying Bow Contacts
Courtesy of BMW OF NORTH AMERICA, INC.

2007 ACCESSORIES AND EQUIPMENT Lights - Technical Data - Cooper

2007 ACCESSORIES AND EQUIPMENT

Lights - Technical Data - Cooper

12 HEADLIGHTS

63 12 HEADLIGHTS R56

HEADLIGHTS R56 - TECHNICAL DATA

Light bulb - xenon light	Type	D1S 12V 35W
Light bulb - driving light	Type	H4 12V 60/55W
Light bulb - high beam	Type	H4 12V 60/55W

13 TURN SIGNAL INDICATOR

63 13 TURN SIGNALS R56

TURN SIGNALS R56 - TECHNICAL DATA

Light bulb - turn signal, front	Type	P21W 12 V 21 W
Light bulb - auxiliary turn signal	Type	WY5W ST 12 V 5 W

14 CLEARANCE AND SIDE MAR

63 14 SIDE CLEARANCE LIGHTS R56

SIDE CLEARANCE LIGHTS R56 - TECHNICAL DATA

Light bulb	Type	W3W 12V 3W
218110 0 0110	1-11-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,

17 FOG LIGHTS, AUXILIARY

63 17 FOG LAMP, ADDITIONAL HEADLIGHT R56

FOG LAMP, ADDITIONAL HEADLIGHT R56 - TECHNICAL DATA

Light bulb, front fog lamps	Type	H8 12V 35W
Bulb, position light	Type	W5W LL 12V 5W
Light bulb, reversing light	Type	

21 REAR LIGHT CLUSTER

63 21 REAR LIGHT CLUSTER R56

REAR LIGHT CLUSTER R56 - TECHNICAL DATA

Bulb - tail/brake light	Туре	W16W 12V 16W

2007 ACCESSORIES AND EQUIPMENT Lights - Technical Data - Cooper

Light bulb - turn signal	Type	P(Y)21W 12V 21W
Light bulb - fog warning lamp	Type	W16W 12V 16W
Light bulb - backup light	Type	W16W 12V 16W

25 BRAKE LIGHTS

63 25 AUXILIARY BRAKE LIGHT R56

AUXILIARY BRAKE LIGHT R56 - TECHNICAL DATA

Light bulb	Туре	12 LEDs
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26 LICENCE PLATE LIGHTS

63 26 LICENSE PLATE LIGHTS R56

LICENSE PLATE LIGHTS R56 - TECHNICAL DATA

Festoon	Type	C5W 12V 5W

31 INTERIOR LIGHTS

63 31 INTERIOR LIGHTS R56

INTERIOR LIGHTS R56 - TECHNICAL DATA

Ceiling light, front	Type	W6W 12V 6W
Ceiling light, rear	Type	W6W 12V 6W
Mirror light	Type	6V 1.2W
Trunk light	Type	W5W 12V 5W
Footwell light	Type	W5W 12V 5W
Footwell light (front door)	Type	W5W 12V 5W
Glovebox light	Type	C5W festoon 12V 5W

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2007 TRANSMISSION

Manual Transmission - Repair Instructions - Cooper

00 COMPLETE TRANSMISSION

23 .. UNIVERSAL TRANSMISSION BRACKET

Special tools required:

- 00 2 030 UNIVERSAL HYDRO-LIFTER BASIC UNIT
- 23 4 150

NOTE:

o Suitable for manual and automatic transmissions

IMPORTANT: Supports (1) can be laterally adjusted by means of screws (2).

Carrier (3) of rear supports (1) can be longitudinally adjusted by means of

screw.

Supports must be adapted in length and width to the transmission.

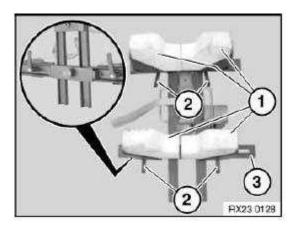


Fig. 1: Supports, Screws, Carrier And Rear Supports Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission:

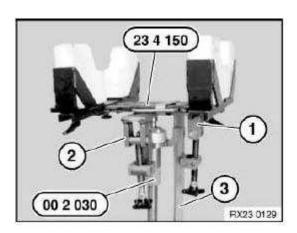
Support transmission with special tools 23 4 150, 00 2 030.

Joint (1) for height adjustment.

Joint (2) for inclination angle adjustment.

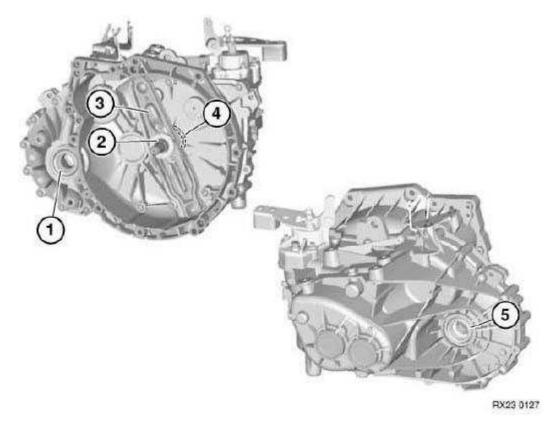
IMPORTANT: Transmission *must* be secured with tensioning strap (3).

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<u>Fig. 2: Tensioning Strap And Special Tools (00 2 030)</u> Courtesy of BMW OF NORTH AMERICA, INC.

23 00 ... OVERVIEW OF GEARBOX CASING (GS6-53BG/DG/55BG)



<u>Fig. 3: Overview Of Gearbox Casing (GS6-53BG/DG/55BG)</u> Courtesy of BMW OF NORTH AMERICA, INC.

0 General information, see 23 00 026 Removing and installing transmission (GS6-55BG)

- 1. Radial seal, see 23 11 211 Replacing rotary shaft seal on right of differential (GS6-53BG/DG/55BG)
- 2. Guide tube

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- 3. Clutch release unit, see <u>21 51 500 REMOVING AND INSTALLING OR REPLACING CLUTCH</u> RELEASE UNIT
- 4 Radial seal
- 5. Radial seal, see 23 11 201 Replacing rotary shaft seal on left of differential (GS6-53BG/DG/55BG)

Complete transmission, oil change, transmission designations

Right

Input shaft

Left

23 00 026 REMOVING AND INSTALLING TRANSMISSION (GS6-55BG)

Special tools required:

- 00 2 030 UNIVERSAL HYDRO-LIFTER BASIC UNIT
- 23 4 150

Necessary preliminary tasks:

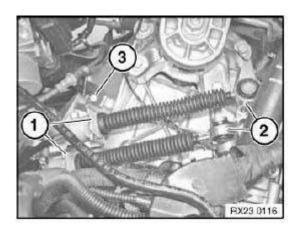
- Disconnect battery
- Secure engine in installation position with special tool, see <u>11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N12, N14)</u>
- Drain gear oil, see <u>00 11 229 OIL CHANGE IN MANUAL TRANSMISSION</u>
- Remove front axle carrier, see 31 11 001 REPLACING FRONT AXLE CARRIER
- Remove transmission support bracket
- Remove transmission mount
- Remove left output shaft, see <u>31 60 003 REMOVING AND INSTALLING OR REPLACING LEFT</u> <u>OUTPUT SHAFT</u>.
- Remove right output shaft, see <u>31 60 004 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT</u>.

Release clips on stop/holder (1).

Detach selector lever cable (2) from ball joint.

Release screw (3) and remove bracket.

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<u>Fig. 4: Stop/Holder, Selector Lever Cable And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug (1) for reversing light switch.

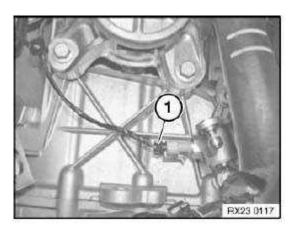


Fig. 5: Plug For Reversing Light Switch Courtesy of BMW OF NORTH AMERICA, INC.

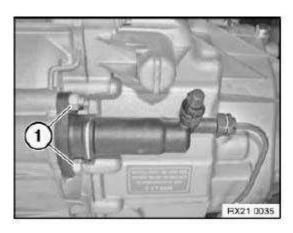
NOTE: Pressure line of clutch slave cylinder remains connected.

IMPORTANT: Relieve tension on clutch slave cylinder slowly; otherwise air will be drawn in through sealing sleeve.

Release nuts (1) and remove clutch slave cylinder.

Tightening torque: 21 52 2AZ, see 21 52 CLUTCH CONTROL (HYDRAULIC).

2007 TRANSMISSION Manual Transmission - Repair Instructions - Cooper



<u>Fig. 6: Clutch Slave Cylinder Nuts</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release starter bolt (1) WAF 13 from above.

Release bolts (2) and remove starter.

Tightening torque: 12 41 4AZ, see 12 41 STARTER MOTOR AND MOUNTING PARTS

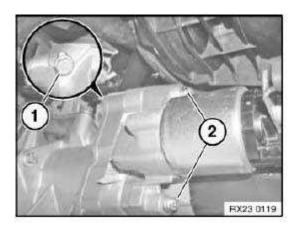


Fig. 7: Starter Bolt Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission:

With special tools $23\ 4\ 150$, $00\ 2\ 030$

Support transmission from underneath.

Secure transmission with tensioning strap (3).

Tasks are described in TRANSMISSION BRACKET.

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After completion of work, check transmission oil level.

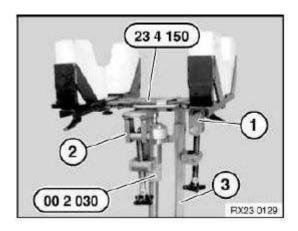


Fig. 8: Tensioning Strap And Special Tools (00 2 030) Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: There is no *bolt* fitted at the lowermost point (1) of the transmission.

Release screws.

Tightening torque: 23 00 1AZ, see 23 00 COMPLETE TRANSMISSION (1 OF 2).

IMPORTANT: Do not allow transmission to hang on transmission input shaft when removing and installing, as the clutch disc will be deformed.

Pull transmission downwards and remove.

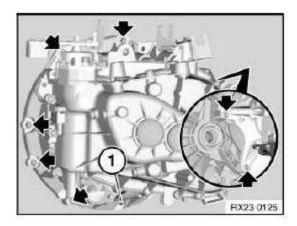


Fig. 9: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check that adapter sleeves (1/2) are correctly seated.

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Replace damaged dowel sleeves.

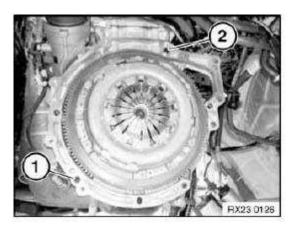


Fig. 10: Adapter Sleeves Courtesy of BMW OF NORTH AMERICA, INC.

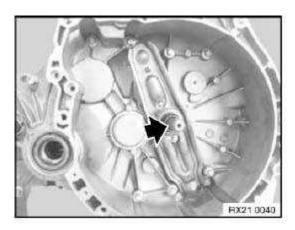
Installation:

Check lubrication of transmission input shaft for sticky

consistency. If grease is sticky, clean drive shaft and replace clutch plate, see <u>21 21 500 REMOVING AND INSTALLING OR REPLACING CLUTCH</u>.

Check clutch plate for friction rust in splines and replace if necessary.

Mechanically remove existing grease and lining abrasion from splines of clutch plate (with a cloth).



<u>Fig. 11: Locating Transmission Input Shaft</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

 Remove and clean release bearing and release lever, see <u>21 51 500 REMOVING AND INSTALLING</u> OR REPLACING CLUTCH RELEASE UNIT

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Lightly grease spline teeth of input shaft.

23 00 039 INSTALLING REPLACEMENT TRANSMISSION (GS6-55BG)

IMPORTANT: After completion of work, check transmission oil level.

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.

Recycling:

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks:

- o Drain gear oil at oil drain plug. Tightening torque: 23 00 1AZ, see 23 00 COMPLETE TRANSMISSION (1 OF 2).
- o Remove transmission, see 23 00 026 Removing and installing transmission (GS6-55BG).

Convert following parts from previous transmission to new transmission.

- Release bearing and release lever, see <u>21 51 500 REMOVING AND INSTALLING OR REPLACING</u> <u>CLUTCH RELEASE UNIT</u>.
- Ball pin and spring wire clip
- Reversing light switch

Add final details to vehicle.

Check oil level.

Installation:

Observe greasing specification, see 23 00 026 Removing and installing transmission (GS6-55BG)

11 HOUSING WITH COVER

23 11 TRANSMISSION DESIGNATIONS

Breakdown of MINI designation:

Manual transmission:

MANUAL TRANSMISSION DESIGNATIONS CHART

2007 TRANSMISSION Manual Transmission - Repair Instructions - Cooper

GS	5-65 BH/SH	
G	Transmission	
S	Transmission type	 S = Manual transmission A = Automatic transmission
5	Number of forward gears	
65		
В	Gear set	 B = Petrol/gasoline gear ratio D = Diesel gear ratio
Н	Code letter of transmission manufacturer	 H = Midland G = Getrag Z = ZF (Zahnradfabrik Friedrichshafen)

Automatic transmission:

AUTOMATIC TRANSMISSION DESIGNATIONS CHART

GAC	GACVT 16Z (CVT) Automatic			
G	Transmission			
A	Transmission type	○ S = Manual transmission		
	Transmission type	○ A = Automatic transmission		
CVT		Electronically controlled continuously variable automatic transmission		
16		Manufacturer's code number		
Z	Code letter of transmission manufacturer	○ Z = ZF (Zahnradfabrik Friedrichshafen)		

AUTOMATIC TRANSMISSION DESIGNATIONS CHART

1101	TO TOTAL THE THE THE PROPERTY DESIGNATIONS CHIRACT		
GA6	GA6F21 WA Automatic		
G	Transmission		
A	Transmission type	S = Manual transmissionA = Automatic transmission	
6	Number of forward gears		
F21		Manufacturer's code number	
WA	Code letter of transmission manufacturer	∘ A = AISIN	

Manual transmission:

MANUAL TRANSMISSION DESIGNATIONS CHART

MINI designation	Manufacturer	Manufacturer designation	Remark
GS5-65BH	Midland	R65	R50
GS6-85DG	Getrag	G285D	R50

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GS6-85BG	Getrag	G285	R53
GS5-52BG	Getrag	G252	R50/52
GS6-53BG	Getrag	G253	R56 N14 engine
GS6-55BG	Getrag	G255	R56 N12 engine
GS6-53DG	Getrag	G253	R56 W16 engine

Automatic transmission:

AUTOMATIC TRANSMISSION DESIGNATIONS CHART

MINI designation	Manufacturer	Manufacturer designation	Remark
GA CVT 16Z	ZF	ECVT	R52
GA 6F21 WA	AISIN	F21	R52/53

23 11 201 REPLACING ROTARY SHAFT SEAL ON LEFT OF DIFFERENTIAL (GS6-53BG/DG/55BG)

Special tools required:

- 23 0 370 DRIFT
- 23 0 490

Necessary preliminary tasks:

• Remove left axle shaft, see <u>31 60 003 REMOVING AND INSTALLING OR REPLACING LEFT</u> OUTPUT SHAFT.

Installation:

Push drive shaft over resistance of snap ring. The drive shaft must snap audibly into place.

Check differential oil level and check for leaks.

Screw special tool 23 0 490 into radial shaft seal (1).

Withdraw radial seal from transmission housing with aid of impact weight.

IMPORTANT: Risk of damage:

Damage to the differential case will result in oil leaks!

2007 TRANSMISSION Manual Transmission - Repair Instructions - Cooper

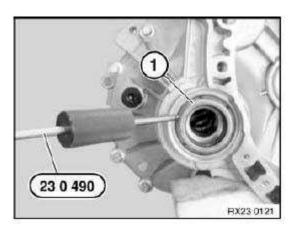


Fig. 12: Special Tool (23 0 490) And Radial Shaft Seal Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of radial seal with gear oil.

Drive radial seal with special tool 23 0 370 into differential case until seal is flush with differential case.

Check differential oil level and check for leaks.

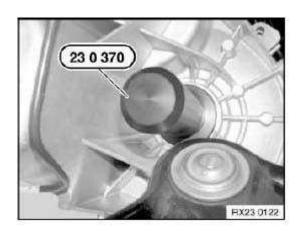


Fig. 13: Special Tool (23 0 370) Onto Radial Seal Courtesy of BMW OF NORTH AMERICA, INC.

23 11 211 REPLACING ROTARY SHAFT SEAL ON RIGHT OF DIFFERENTIAL (GS6-53BG/DG/55BG)

Special tools required:

- 23 0 370 DRIFT
- 23 0 490

2007 TRANSMISSION Manual Transmission - Repair Instructions - Cooper

Necessary preliminary tasks:

• Remove right axle shaft, see <u>31 60 004 REMOVING AND INSTALLING / REPLACING RIGHT</u> OUTPUT SHAFT.

Installation:

Check differential oil level and check for leaks.

Screw special tool 23 0 490 into radial shaft seal (1).

Withdraw radial seal from transmission housing with aid of impact weight.

IMPORTANT: Risk of damage:

Damage to the differential case will result in oil leaks!

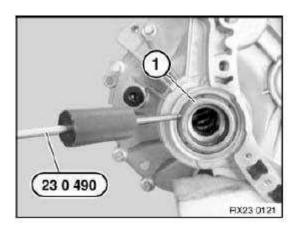


Fig. 14: Special Tool (23 0 490) And Radial Shaft Seal Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of radial seal with gear oil.

Drive radial seal with special tool 23 0 370 into differential case until seal is flush with differential case.

Check differential oil level and check for leaks.

2007 TRANSMISSION Manual Transmission - Repair Instructions - Cooper



Fig. 15: Special Tool (23 0 370)
Courtesy of BMW OF NORTH AMERICA, INC.

23 11 608 REPLACING GUIDE TUBE FOR CLUTCH RELEASE UNIT (GS6-53BG/53DG/55BG)

Necessary preliminary tasks:

- Remove transmission
- Remove clutch controller and release lever from guide tube.

Release bolts (1).

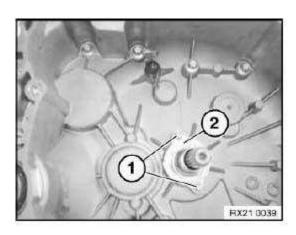
Remove guide tube (2).

Installation:

Replace screws.

Clean new guide tube.

Guide surface must be clean (no labels/stickers or residual adhesive, etc.).



2007 TRANSMISSION Manual Transmission - Repair Instructions - Cooper

Fig. 16: Bolts And Guide Tube Courtesy of BMW OF NORTH AMERICA, INC.

12 BEARING IN HOUSING, SEALING RING

23 12 506 REPLACING RADIAL DRIVE SHAFT SEAL (GS6-53BG/53DG/55BG)

Special tools required:

- 23 0 380
- 23 0 490

NOTE: After completion of work, check transmission fluid level.

Use only the approved transmission fluid.

Failure to comply with this requirement will result in serious damage to the

manual transmission!

Necessary preliminary tasks:

- Remove transmission
- Remove clutch release bearing.

Release bolts (1) and remove guide tube (2).

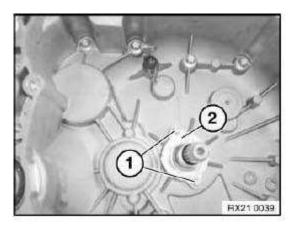


Fig. 17: Bolts And Guide Tube Courtesy of BMW OF NORTH AMERICA, INC.

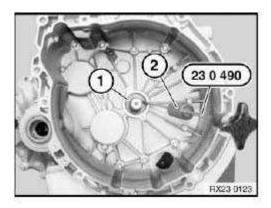
Drive a hole into radial shaft seal (1) using a center punch.

IMPORTANT: Do not use a drill as drillings may result in transmission malfunction.

Screw in special tool 23 0 490.

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Drive out radial shaft seal (1) with impact weight (2).



<u>Fig. 18: Radial Shaft Seal And Impact Weight</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of radial seal with gear oil.

Push radial seal onto special tool 23 0 380 and drive firmly home.

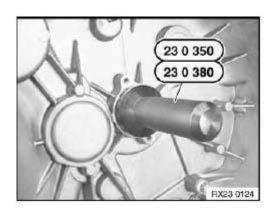


Fig. 19: Special Tools (23 0 350) And (23 0 380) Courtesy of BMW OF NORTH AMERICA, INC.

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2002-09 GENERAL INFORMATION

Passive Safety Systems - Overview - MINI

MINI MULTIPLE RESTRAINT SYSTEM 4

MULTIPLE RESTRAINT SYSTEM (MRS 4)

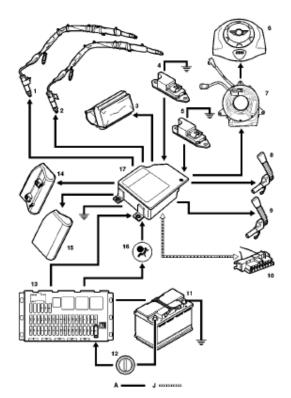
Purpose of the System

The multiple restraint system (MRS) provides enhanced passive protection for vehicle occupants in the event of a serious collision. The system is regarded as passive in the respect that it operates automatically without preconditional interactions by the vehicle occupants.

The MRS system consists the following components:

- MRS control unit
- Driver's airbag module
- Front passenger's airbag module
- Driver's side (thorax) airbag module
- Front passenger's side (thorax) airbag module
- Advanced Head Protection System (AHPS2) airbag Right Hand
- Advanced Head Protection System (AHPS2) airbag Left Hand
- Driver's seat belt pre-tensioner
- Front passenger's seat belt pre-tensioner
- MRS warning lamp (in instrument cluster)
- Crash sensor side impact (x 2)
- Seat belt buckle switches
- Slip Ring

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MRS 4 Components

- A. Hard Wired
- J. Diagnostic Bus
- 1. Advance Head Protection (AHPS2) Right side
- AHPS2 Left Side
- 3. Front Passenger Airbag Module
- 4. Crash Sensor Side Impact Right Side
- Crash Sensor Side Impact Left Side
- 6. Driver Airbag Module
- 7. Rotary Coupler
- 8. Front Seat Belt Pre-tensioner Right Side
- 9. Front Seat Belt Pre-tensioner Left Side
- 10. Diagnostic Connector
- 11. Battery
- 12. Ignition Switch
- 13. Passenger Compartment Fusebox
- 14. Side (Thorax) Airbag Left Side
- 15. Side (Thorax) Airbag Right Side
- 16. MRS Warning Lamp in Instrument Cluster
- 17. MRS Control Unit

<u>Fig. 1: MRS 4 Components</u> Courtesy of BMW OF NORTH AMERICA, INC.

System Components



The MRS Control Unit contains 2 internal collision detection sensors to determine the severity of the crash.

MRS Control Unit

Fig. 2: MRS Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

The MRS control unit is secured centrally on the body floor panel (center tunnel - between the handbrake and the gear selector lever) by three nuts. A 50-pin connector provides the MRS control unit connection with the vehicle harness. Access to the control unit is only possible when the main floor carpet is removed from the vehicle

Main Sensor

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The main sensor is a deceleration detection device which is contained in the MRS control unit. The sensor consists of a spring and weight system which is attached to strain gauges in a Wheat stone bridge circuit. If a change in strain gauge resistance is greater than a preset value, it corresponds to a crash condition of sufficient severity to warrant MRS component deployment. In this case, the processor provides a signal to initiate airbag module and/or seat belt pre-tensioner deployment. Deployment will only be carried out if a confirmation signal that a crash condition is occurring is received by the MRS control unit. Crash condition confirmation is achieved by the simultaneous actuation of the safing sensor.

For side impacts, the side impact crash sensors provide additional inputs to the control unit for determining and confirming a crash condition in conjunction with the control unit's internal accelerometer.

For front angled impacts, the control unit acts in co-operation with the side impact crash sensors, to determine which airbags and seat belt pre-tensioners need to be deployed.

For rear impacts, the control unit uses a rear impact trigger threshold to determine that a severe rear collision has occurred and deploys all seat belt pre-tensioners, to restrain vehicle occupants.

Workshop Hint

Wheatstone Bridge circuits are used to measure resistance, inductance and capacitance. They consist of 4 resistors arranged in a diamond orientation. Excitation voltage is applied between the top and bottom of the diamond, output voltage is measured across the sides. One or more of the legs contain a resistive transducer, a strain gauge. Based on the change in resistance of the strain gauge the legs go from "balanced" to "unbalanced".

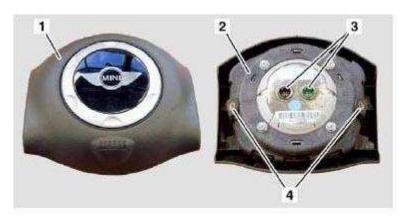
Safing Sensor

This sensor is also contained within the MRS control unit and is included in the control unit internal circuitry to prevent unintentional detonation of MRS components. The safing sensor is connected in series with the main sensor and operates at comparatively lower rates of deceleration. When the safing sensor closes in conjunction with the main sensor exceeding its trigger value, electronic switches are activated, allowing electrical current to be supplied to the driver and passenger airbags and the relevant seat belt pre-tensioners.

The operation of the side (thorax) airbag modules and the Advanced Head Protection System (AHPS2) airbags are controlled by electronic switching in response to the threshold value for the side impact sensors being exceeded.

Drivers Airbag Module

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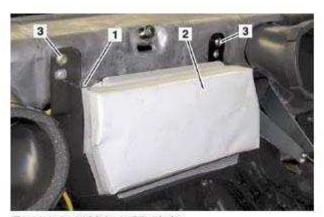


- 1. Polyurethane Cover
- 2. Housing
- 3. Electrical Connectors
- 4. Mounting Points X2

Fig. 3: Drivers Airbag Module Courtesy of BMW OF NORTH AMERICA, INC.

The driver's airbag is of a two-stage design and attached to the steering wheel by two captive bolts. Electrical connection to the MRS control unit is provided via the rotary coupler. The fully inflated airbag has a capacity of 57 liters. Once the airbag is fully inflated, vents in the airbag prevent further pressure build-up, so that progressive deceleration is provided as the driver contacts the cushion and injury due to sudden impact forces is prevented. The design of the airbag is **'tuned'** to match the crush characteristics of the vehicle as well as the steering wheel and collapsing steering column behavior.

Passenger Airbag Module



- 1. Housing
- 2. Paper Cover
- 3. Mounting Point X2

Passenger Airbag Module

<u>Fig. 4: Passenger Airbag Module</u> Courtesy of BMW OF NORTH AMERICA, INC.

The passenger front airbag module is located above the stowage tray, directly in front of the passenger seat. The airbag module is mounted to the body cross car beam by means of four Torx bolts, which are capable of withstanding the forces of deployment. The airbag container is a pressed steel fabrication that is designed to withstand the high rate of pressurization.

The unit contains a gas generator and igniter module, which incorporates the nitrocellulose igniter charge and pressurized gas chambers surrounded by a filter screen. The filter prevents solid combustion by-products from entering the airbag during deployment.

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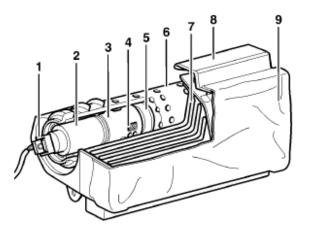
A link lead connects the airbag module to the main vehicle harness. The other end of the link lead terminates in a squib connector on the left hand side and a squib connector on the right hand side of the passenger airbag module.

Only disconnect the connectors from the airbag module if the airbag module is being removed, otherwise disconnect at the harness end of the link lead.

To disconnect the link lead at the airbag module end, lift the locking cap of the connector to unlatch, and then pull the connector away from the module. Do not pull on the link lead harness. When reconnecting, ensure the connector is fully mated in the socket of the airbag module then press the hinged locking cap into place to secure the connector in position.

The front of the airbag module has a strong paper cover which ruptures when the airbag is deployed. The unfolding airbag then breaks the deployment door perforations in the front fascia; the deployment door remains attached to the fascia by a plastic hinge on its upper inside edge.

Once free of the housing and fascia the airbag inflates to its full extent to provide a protective cushion between the front seat passenger and the fascia/windshield. Vents in the airbag prevent excess pressure bursting the bag and, as soon as the material in the gas generator is exhausted, the airbag deflates. The passenger front airbag has a capacity of 110 liters.



- 1. Electrical Connectors
- 2. Nitrocellulose Chamber (containing squib)
- Mixing Chamber
- 4. Gas Release Port
- 5. Pressurized Nitrogen/Argon Gas Chamber
- Filter
- 7. Folded Nylon Bag
- 8. Housing
- 9. Paper Cover

Components of Passenger Airbag Module

Fig. 5: Components Of Passenger Airbag Module Courtesy of BMW OF NORTH AMERICA, INC.

Side (Thorax) Airbag Modules

2002-09 GENERAL INFORMATION Passive Safety Systems - Overview - MINI



Side Airbag Module

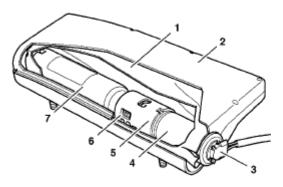
Fig. 6: Side (Thorax) Airbag Modules
Courtesy of BMW OF NORTH AMERICA, INC.

The driver and passenger side (thorax) airbags are mounted to the front seat backrest frame and are designed to protect the ribs and upper internal organs during side impacts. The modules are side specific (i.e. a right hand module must be fitted to a right hand seat and a left hand module must be fitted to a left hand seat). The side airbags are activated by a control signal from the MRS control unit in the event of a side impact or a front angled impact of sufficient severity to cause both front and side airbag deployment.

The side (thorax) airbag module is consists of a molded plastic case which houses a folded nylon fabric bag, the gas generating capsules and an igniter squib. The rear of the side airbag module features two studs that are used for mounting the module to the seat frame and are secured in position by two nylon lock nuts.

The side airbag modules have a fly lead which terminates in a 2-pin connector. The connector connects to the control unit via the main harness and is located beneath the seat.

The side airbag has a capacity of 10.5 liters.



Components of Side Airbag Module

- Folded Nylon Bag
- 2. Molded Plastic Case
- 3. Electrical Connector (Non-Removable)
- 4. Nitrocellulose Chamber
- 5. Mixing Chamber
- 6. Filter/Gas Release Port
- 7. Pressurized Nitrogen/Argon Chamber

Fig. 7: Components Of Side Airbag Module Courtesy of BMW OF NORTH AMERICA, INC.

Workshop Hint

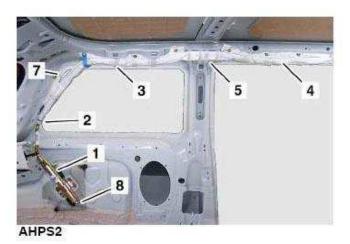
If a new side airbag module shows any sign of damage, **DO NOT USE**.

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Workshop Hint

Do not try to remove the connector at the module end, it is a permanent connection.

Advanced Head Protection System (AHPS2)



- 1. Igniter/Gas Generator
- 2. Crimped Metal Clip
- 3. Plastic Retaining Clips X 6
- 4. Inflatable Nylon Bag
- 5. Bracket (At Top of B Pillar)
- Front Tether Strap (Secured on A Pillar) not shown
- 7. Rear Tether Strap (Secured on C Pillar)
- 8. Electrical Connector

Fig. 8: Advanced Head Protection System (AHPS2) Courtesy of BMW OF NORTH AMERICA, INC.

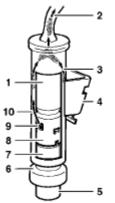
The head airbag, known as the Advanced Head Protection System (AHPS2) offers the vehicle occupants in the front and rear additional protection from impacts. The airbag is located behind the interior trim above the door and rear side glass. The igniter/gas generators are fixed to the body rear inner side panels in the luggage compartment. The airbag itself is tethered to the body by two securing straps and bolts, one at the A post, the other on the C post. In between the two tether points, the airbag is held in place with six plastic clips, which are designed to break apart as the airbag inflates. The center portion of the folded airbag is retained on a metal bracket which itself is secured to the body by two bolts and located at the top of the B post.

The 15 liter head airbag is filled with nitrogen/argon gas from a pressurized chamber and remains inflated slightly longer than conventional airbags, this is to provide additional head protection in the event of a secondary impact.

To disconnect the vehicle harness lead from the gas generator, lift the locking cap of the connector to unlatch and then pull the connector away from the module. Do not pull on the harness lead. When reconnecting, ensure the connector is fully mated in the socket of the airbag module then press the hinged locking cap into place to secure the connector in position.

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Pressurized Nitrogen/Argon Chamber



- 4. Mounting Bracket
 - Electrical Connector

3. Released Gas

2. Gas Out to Inflate Airbag

- Gas Generator Seal
- 7. Nitrocellulose Chamber
- 8. Mixing Chamber
- 9. Filter/Release Port
- 10. Outer Manifold

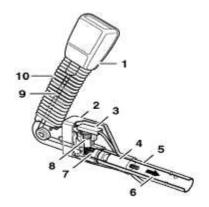
AHPS2 Components

Fig. 9: AHPS2 Components **Courtesy of BMW OF NORTH AMERICA, INC.**

Seat Belt Pre-Tensioners

Inertia reel three point seat belts are installed at each seat position, front and rear. The inertia reels are of the ALR (Automatic Locking Retractor) type. The MRS control unit at a slightly lower threshold level than the front airbags activates the front seat belt pre-tensioners.

The two pre-tensioners are side specific, but otherwise identical. Each pre-tensioner has a tube containing propellant and a piston. The piston is attached to a steel cable, the opposite end of which is attached to the seat belt buckle. An igniter (squib) in the base of the tube provides an ignition source when triggered by a fire signal from the MRS control unit. A fly lead with a 2-pin connector links the igniter to the vehicle's MRS wiring and is located on a bracket underneath the seat frame



- Seat Belt Buckle
- Molded Plastic Casing
- 3. Electrical Connector
- 4. Piston
- Piston Housing
- Direction of Piston Travel
- 7. Expanding Nitrogen Gas
- 8. Igniter/Gas Generator
- 9. Steel Cable
- Collapsible Gaiter

Fig. 10: Seat Belt Pre-Tensioners Courtesy of BMW OF NORTH AMERICA, INC.

BST (Battery Safety Terminal) COOPER S Only

The BST is installed in the COOPER S due the battery location in the luggage compartment. Because of this, MINI implements a comprehensive electrical fusing system in the MINI with the goal of minimizing the danger of short circuits in the event of a severe accident.

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To achieve this, the vehicle's electrical system was divided into the starter circuit and the vehicle system supply circuit. The vehicle system supply circuit is protected against short circuits by means of special high current fuses. The cable to the starter and the alternator - which cannot be protected by conventional methods of fusing since it must carry very high current when the starter is engaged and is permanently subjected to voltage - is protected by the Battery Safety Terminal (BST). This fusing method practically excludes the danger of a short circuit in the event of a severe accident.

The BST consists of a conventional clamp that is screwed onto the positive terminal from above and connected with a hollow cylinder. A propellant charge is stored in this hollow cylinder. Just as with the airbag and seat belt pre-tensioner, this pyrotechnic device is controlled and ignited from the MRS control module. The triggering strategy is also the same as for the triggering of the airbag, and it possesses identical protection logic. The overall unit is enclosed in a plastic shell that captures the cable if it is forced out and locks it so that a renewed contact is no longer possible.

Side Impact Sensors



The side impact crash sensors must be fitted in the correct orientation, and there must be no gap between the sensor and the body mounting position. Ensure the mounting screws are tightened to the correct torque. Be careful when refitting trim molding not to damage sensors or sensor harness.

Side Impact Sensor

Fig. 11: Side Impact Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Side Impact Sensor

The side impact crash sensors must be fitted in the correct orientation, and there must be no gap between the sensor and the body mounting position. Ensure the mounting screws are tightened to the correct torque. Be careful when refitting trim molding not to damage sensors or sensor harness.

The side impact sensors are located behind the rear lower quarter trim moldings, and mounted to the body floor via their own mounting brackets, in alignment with the rear seat cushion front mountings. Each sensor is attached to their body mounting bracket by two Torx bolts.

Each side impact sensor consists of an electronic accelerometer, microprocessor and serial link circuit. The sensor uses the accelerometer to determine the severity of a side impact, and if the impact is great enough to warrant multiple restraint operation, the sensor communicates the need for deployment to the MRS control unit via a single line serial link.

Seat Belts

An inertia reel, three point seat belt is installed at each seat position (front and rear). The front seat inertia reels incorporate a liftshaft locking system with webbing sensor and car sensor activating mechanisms. The webbing

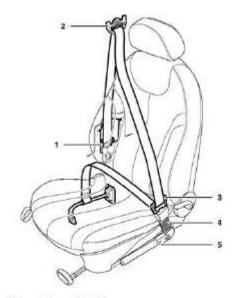
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sensor activates the locking system if the webbing is subjected to a sharp pull. The car sensor activates the locking system if the vehicle is subjected to sudden deceleration or a severe tilt angle.

The inertia reel of each front seat belt is attached to the body B post, behind the rear quarter trim casing. A locating peg on the top front of the pre-tensioner unit mates with the B post to prevent rotation, and a bolt at the base of the unit secures the pre-tensioner to the body. The seat belt webbing runs from the inertia reel, up to a height adjuster on the B post to an anchor rail just above floor level. The height adjuster unit is attached to the upper B post by two Torx screws and the webbing runs through a 'D-loop', which is attached to the adjuster by a Torx bolt. The seat belt fixing point of the mechanism slides up and down the adjuster to provide the required seat belt setting. The webbing then passes through an aperture in the B post upper trim and the long end is attached to an anchor rail which is secured to the floor panel cross member at the base of the B post.

The buckle assembly for each seat belt is attached to the inboard side of each seat frame and incorporates a flexible stalk and pre-tensioner.

Seat belt warning switches are fitted into both front seat belt buckles. Both the driver and passenger buckle switches have three-wire switches, all of which are connected to the MRS control unit.



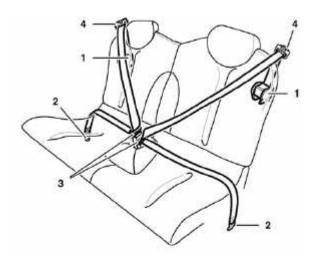
Front Seat Belts

- 1. Inertia Reel
- 2. Height Adjuster
- 3. Seat Belt buckle
- Flexible Stalk
- 5. Pre-Tensioner

Fig. 12: Front Seat Belts

Courtesy of BMW OF NORTH AMERICA, INC.

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Rear Seat Belts

- 1. Rear Seat Belt Inertia Reels
- 2. Seat Belt Anchor Points
- 3. Seat Belt Buckles
- 4. Upper Seat Belt Anchor Points

Fig. 13: Rear Seat Belts

Courtesy of BMW OF NORTH AMERICA, INC.

The inertia reel of both rear seat belts are attached to the body inner rear quarter panel. Each inertia reel is fixed to the body rear inner quarter panel by a bolt with a locating tag holding the assemblies in position on the body.

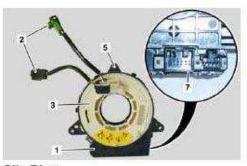
The seat belt webbing passes from the inertia reel through the C post upper trim with the long end of the webbing secured to the body rear inner quarter panel.

The buckle assembly for the rear seat belts is mounted directly to the body floor via a mounting bracket. This mounting bracket is secured by a single Torx bolt.

Slip Ring (Rotary Coupler)

The slip ring is installed on the steering column, behind the steering wheel to provide the electrical interface between the fixed wiring harness and the moveable driver airbag module. The rotary coupler is attached to the steering column casting by three screws.

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- Outer Ring
- 2. Pigtail Connectors to Driver's Airbag Module X2.
- 3. Rotary Unit
- 5. Mounting Holes X 3
- 7. MRS Hamess Connector

Slip Rlng

Fig. 14: Slip Ring Courtesy of BMW OF NORTH AMERICA, INC.

In addition to the wiring for the driver airbag, the slip ring also provides the wiring for other electrical functions built into the steering wheel area, these may include:

- Audio system remote control switches
- Cruise control system switches
- Horn switches

A rotating link harness is enclosed in a plastic cassette comprising outer and inner housings with integral connectors. The cassette contains a flat ribbon type flexible cable. The slip ring housing is part of the direction indicator and windshield wiper/washer housing. The complete assembly is attached to the steering column by three screws.

The slip ring connects to the driver's airbag module via two, 2-pin connectors at the end of a pigtail connector. A 4-pin socket is included at the rear of the rotary coupler that connects to a 4-pin plug from the main harness. When a slip ring is installed, it should be set at its

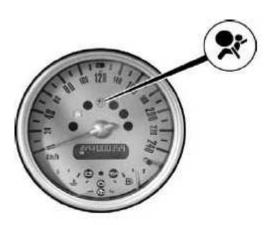
centered position while the vehicle's front road wheels are in the straight ahead position. The centered position of the slip ring is indicated by the white segment on the indicator wheel on the front face of the coupler. A new rotary coupler has a locking tab which ensures the unit is locked at its factory centered position. This peg should remain intact until just before steering wheel attachment.

MRS Warning Lamp

The red MRS warning LED is located in the instrument cluster and is illuminated for a short period after switching the ignition to position 1.

If a fault is present within the MRS, the LED will illuminate and remain on until the ignition is switched off. With the warning LED on the MRS may not operate in the event of a collision.

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MRS Warning Lamp

Fig. 15: MRS Warning Lamp Courtesy of BMW OF NORTH AMERICA, INC.

Principle of Operation

All system operations become active when the ignition switch is turned to position 1 and remains operational when the ignition switch is in the CRANK position (position 3). When the ignition switch is turned on, the MRS warning lamp illuminates for approximately 4 seconds and then turns off, this indicates that the system is functional.

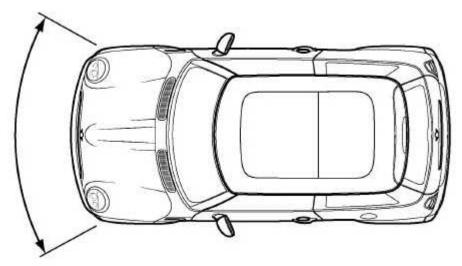
Front Impacts

The front airbags, the front seat belt pre-tensioners and BST are deployed in the event of a frontal impact of sufficient severity that exceeds the MRS control unit impact trigger threshold.

When the accelerometer and safing sensor in the MRS control unit senses the impact, the control unit triggers the front airbag modules by firing an igniter:

- Driver's front airbag the igniter in turn burns tablets of sodium azide, which generate a large amount of nitrogen gas causing airbag inflation.
- Passenger front airbag the igniter causes pressurized gas to be released from integral gas canisters for airbag inflation.

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Front Impact Range

<u>Fig. 16: Front Impact Range</u> Courtesy of BMW OF NORTH AMERICA, INC.

The front airbags are fully inflated as the occupants move into contact with the airbag. After full inflation has been reached, the airbags then immediately discharge the gas from vent holes to provide progressive deceleration for the moving occupant and thus reduce the risk of injuries caused by the force of the airbag acting against the occupant.

The control unit simultaneously triggers the front seat belt pre-tensioner operation. An igniter in the seat mounted buckle assembly causes propellant to burn producing nitrogen gas.

The expanding nitrogen gas drives a piston along the piston tube, the rear of the piston is attached to a steel cable, and the other end of the steel cable is connected to the seat belt buckle.

The tension produced through the steel cable under the influence of the moving piston causes the buckle to be drawn down towards the buckle anchorage. The resulting shortened seat buckle stalk removes any slack in the seat belt in time to restrain the seat occupant during impact and airbag deployment.

The seat belt pre-tensioners have a lower activation threshold than the front airbags, therefore the pre-tensioner will deploy earlier. Depending on the severity of the crash it is possible that only the seat belt pre-tensioner will deploy and the front airbags will not (minor crashes).

The MRS control unit is able to distinguish between rough road conditions and a frontal collision. If the control unit's main sensor detects a frontal collision of sufficient severity and it is confirmed by the safing sensor, the control unit sends a fire signal to the relevant airbag module and seat belt pre-tensioner initiators.

Side Impacts

The driver and passenger side (thorax) airbags and the advanced head protection system (AHPS2) airbags are deployed in the event of a side impact of sufficient severity which exceeds the side impact trigger threshold of the side impact crash sensors. When the MRS control unit receives a signal from one of the side impact crash sensors in conjunction with the internal main sensor, the control unit activates the side (thorax) airbag and the

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AHPS2 airbag on the side of the vehicle suffering the impact [also with a separate threshold the BST. The main sensor works as a "safing sensor" it must confirm the side impact request by the side sensors to deploy the airbags.

A current from the control unit triggers the module to ignite a small quantity of nitrocellulose to generate nitrogen gas. The expanding nitrogen gas punctures a pressurized argon and nitrogen gas chamber, the released gas mixes with the gas released from the nitrocellulose chamber and the combined gas expands causing airbag inflation. The inflating side (thorax) airbag bursts out of the seat cover at the outboard piping and pushes the seat occupant away from the impact force. At the same time, the AHPS2 airbag module is deployed using a similar deployment method; as the AHPS2 airbag expands it breaks out from beneath the headlining trim to protect the occupant(s) from head injuries.

When fully deployed, the side airbags offer additional protection to the front seat occupants in the event of a collision acting on the side of the vehicle. Either the driver's side airbag circuit or the passenger's side airbag circuit is activated depending on the side of the vehicle suffering the impact. After the airbags have fully inflated, the airbags progressively deflate the gas from vent holes to reduce the risk of injuries. The AHPS2 airbag deflates at a slower rate than for front and side (thorax) airbags, this is to provide additional head protection in the event of a secondary impact.

Rear Impact

The control unit detects the direction of impact, and if the impact exceeds the rear impact trigger threshold both front seat belt pre-tensioners and the BST are activated.

Front Angled Impacts

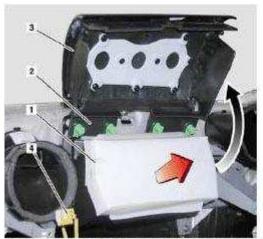
The deployment of airbags and seat belt pre-tensioners that occur when a vehicle is involved in a front angled collision is dependent on the speed and angle of the impact. Four possible conditions could apply:

- Impact is below the threshold for the control unit's front impact sensor and the side impact crash sensors no response, none of the airbags or seat belt pre-tensioners are activated.
- The speed and angle of the impact is in excess of the front impact trigger threshold, but below the threshold of the side impact crash sensors the driver's airbag, passenger's front airbag and front seat belt pre-tensioners are activated.
- The speed and angle of the impact is in excess of the side impact trigger threshold, but below the control unit's front impact trigger threshold the driver's side (thorax) and AHPS2 airbag circuits are activated in a driver's side impact and the passenger side (thorax) and AHPS2 airbag circuits are activated in a passenger's side impact. In addition, both front seat belt pre-tensioners are activated.
- Both the front and side impact trigger thresholds are exceeded, the driver's front airbag, passenger's front airbag and both front seat belt pre-tensioners are activated. In addition, the side (thorax) airbags and the AHPS2 airbags on the side of the vehicle suffering the impact are activated.

Roll Over

The MRS system does not specifically detect roll over conditions, but if as a consequence of the crash situation the system front or side trigger thresholds are exceeded, the relevant airbags and front seat belt pre-tensioners are deployed.

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- 1. Inflating Air Bag
- 2. Dash Panel Hinge
- 3. Dash Cover for Front Passenger Airbag
- 4. Module Locking Squib Connector x2

Passenger Side Airbag Deployment (<2005 MY)

<u>Fig. 17: Passenger Side Airbag Deployment</u> Courtesy of BMW OF NORTH AMERICA, INC.

Workshop Hint

After repair of damage caused by a collision in which the airbag(s) did not deploy, the integrity of the MRS system must be checked using GT1.

Workshop Hint

Following deployment of the MRS within the vehicle, under any circumstances, all system components must be replaced.

Inertia Sensor (before 9/2002 production)



Fig. 18: Inertia Sensor Courtesy of BMW OF NORTH AMERICA, INC.

Passive Safety functions handled by Inertia Sensor:

• Fuel pump shut-off.

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- Door unlock signal to BC1
- Window down Signal to BC 1
- Hazard warning lights on signal to BC1
- Turns interior lights on.

The inertia switch has a threshold of 14G's. When the threshold is exceeded the switch goes open. This open causes the shutoff of power to the fuel pump relay.

The BC1 sees the open and activates the door lock motors to the unlock position, supplies power to the windows for down operation for 750ms. and activates the hazard warning lights.

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2007 HVAC

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00 GENERAL

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

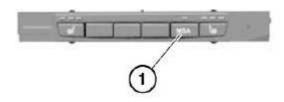
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 1: Identifying MSA Button Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

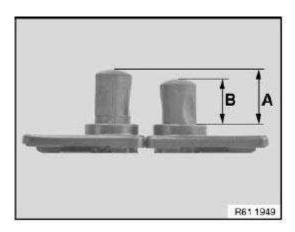
A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

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<u>Fig. 2: Identifying Engine Hood/Bonnet Contact</u> Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

NOTE: For further information on automatic engine start-stop system (MSA):

• Refer to **GENERAL ELECTRICAL SYSTEM - REPAIR INSTRUCTIONS - 2007 HATCHBACK**.

11 HEATER WITH OPERATION

64 11 ... INSTALLING SERVODRIVE

Installation:

If necessary, align shaft of flap(s) to be actuated to position of servodrive to be installed.

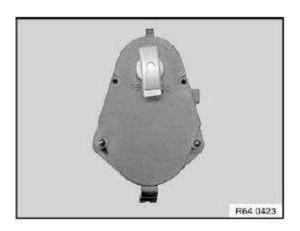


Fig. 3: Identifying Servodrive Courtesy of BMW OF NORTH AMERICA, INC.

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64 11 200 REMOVING AND INSTALLING/REPLACING HEATER

WARNING: Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant R 134a. Follow safety instructions for handling refrigerant oil.

WARNING: Follow instructions for working on cooling system.

Necessary preliminary tasks:

- Draw off refrigerant from A/C system
- Remove carrier for instrument panel
- Remove intake filter housing

Unlock and detach coolant lines (1).

Carefully blow through double pipe to remove remaining coolant from heater core.

Slacken nut (2).

Disconnect refrigerant lines (3).

Installation:

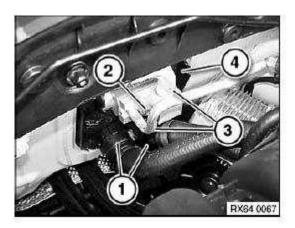
Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Ensure gasket (4) is correctly seated.

Replace all sealing rings and moisten with suitable refrigerant oil prior to fitting.

Vent cooling system and check for leaks.

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<u>Fig. 4: Identifying Refrigerant Lines And Nut</u> Courtesy of BMW OF NORTH AMERICA, INC.

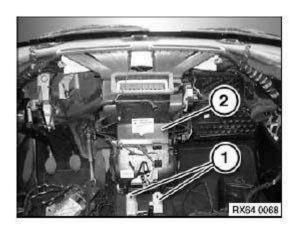
Remove holder (1).

Remove heater (1) with a 2nd person helping.

Installation:

Heater is held by carrier for instrument panel.

When installing carrier for instrument panel, make sure heater is in correct position.

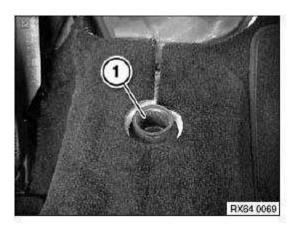


<u>Fig. 5: Identifying Holder And Heater</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure heater is correctly seated on condensate drain (1).

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<u>Fig. 6: Identifying Condensate Drain</u> Courtesy of BMW OF NORTH AMERICA, INC.

64 11 207 REPLACING HEATER CORE

WARNING: Follow instructions for working on cooling system.

Necessary preliminary tasks:

• Remove intake filter housing

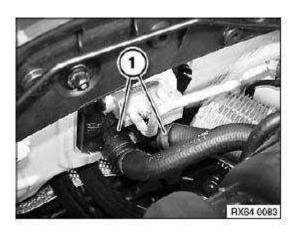
Unlock and detach coolant lines (1).

Carefully blow through twin pipes to remove remaining coolant from heater core.

Installation:

Make sure coolant lines (1) are correctly seated.

Vent cooling system and check for leaks.



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Fig. 7: Identifying Coolant Lines Courtesy of BMW OF NORTH AMERICA, INC.

Remove trim for instrument panel at bottom left.

Release screws (1) and feed out cover (2) towards bottom.



<u>Fig. 8: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Have cloths or paper towels ready in order, if necessary, to catch escaping coolant.

Release screws (1) and pull out heater core (2) approx. 10 mm.

Release screw (5).

Unclip holder (3) and remove.

Carefully pull twin pipes (4) out of heater core (2) and if necessary catch escaping coolant.

Carefully pull out heater core (2).

Installation:

Fins of heater core (2) must not be damaged.

Make sure heater core (2) is correctly seated.

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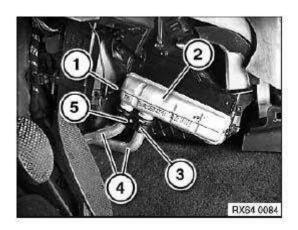


Fig. 9: Identifying Screw, Holder And Heater Core Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, remove sealing rings (1) from heater core (2).

Replace all sealing rings (1).

Coat new sealing rings (1) with anti-seize agent and fit on twin pipes (3).

Make sure twin pipes (3) are correctly seated on heater core (2).

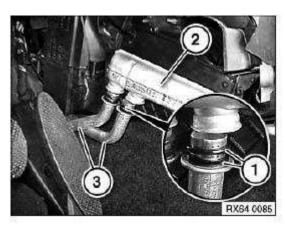


Fig. 10: Identifying Sealing Rings And Twin Pipes Courtesy of BMW OF NORTH AMERICA, INC.

64 11 210 REMOVING AND INSTALLING/REPLACING HEATER BLOWER

Necessary preliminary tasks:

• Remove trim for instrument panel at bottom left (driver's side)

Release screws (1) and feed out cover (2) towards bottom.

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Fig. 11: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, illustration shows instrument panel removed.

Disconnect plug connection (1).

Release screws (2) and feed out blower (3).

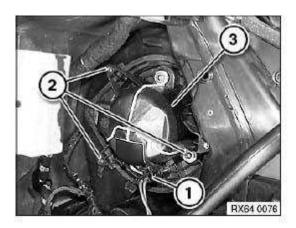


Fig. 12: Identifying Plug Connection And Screws Courtesy of BMW OF NORTH AMERICA, INC.

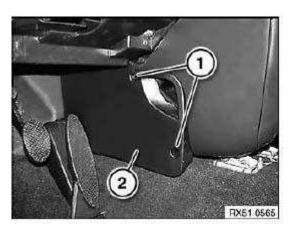
64 11 212 REMOVING AND INSTALLING BLOWER FOR HEATING AND A/C UNIT (IHKR/IHKA)

Necessary preliminary tasks:

• Remove trim for instrument panel at bottom left (driver's side)

Release screws (1) and remove cover (2).

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<u>Fig. 13: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, illustration shows instrument panel removed.

Disconnect plug connection (1).

Release screws (2) and feed out blower (3).

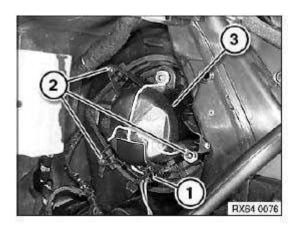


Fig. 14: Identifying Plug Connection And Screws Courtesy of BMW OF NORTH AMERICA, INC.

64 11 221 REPLACING RESISTOR FOR HEATING AND A/C UNIT BLOWER (IHR/IHKR)

Release screws (1) and feed out cover (2) towards bottom.

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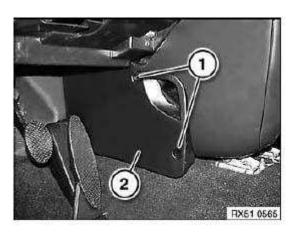


Fig. 15: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Turn resistor (2) to left slightly and remove.

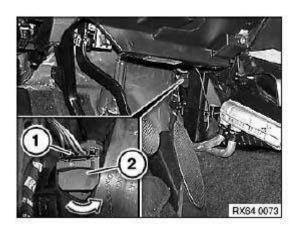
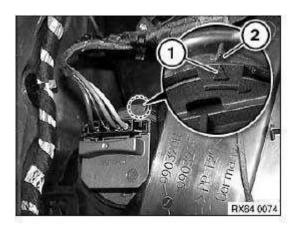


Fig. 16: Identifying Plug Connection And Resistor Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Marking (1) on resistor must match up with marking (2) on heater.

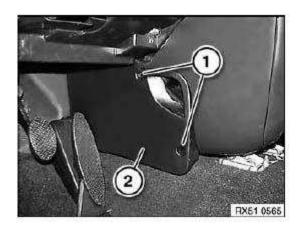
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<u>Fig. 17: Identifying Marking On Resistor</u> Courtesy of BMW OF NORTH AMERICA, INC.

64 11 225 REPLACING CONTROLLER FOR HEATING AND A/C SYSTEM BLOWER

Release screws (1) and feed out cover (2) towards bottom.



<u>Fig. 18: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Turn controller (2) to left slightly and remove.

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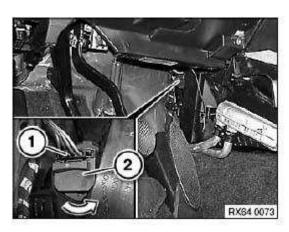
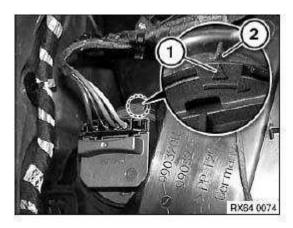


Fig. 19: Identifying Plug Connection And Resistor Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Marking (1) on controller must match up with marking (2) on heater.



<u>Fig. 20: Identifying Marking On Resistor</u> Courtesy of BMW OF NORTH AMERICA, INC.

64 11 367 REMOVING AND INSTALLING (REPLACING) CONTROL PANEL FOR HEATER - A/C SYSTEM

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

Necessary preliminary tasks:

• Remove center console trim

Release screws (1).

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Remove control panel for heater - A/C system (2).

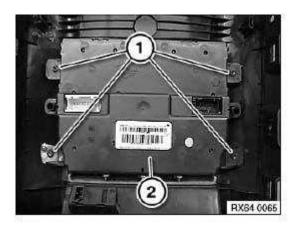


Fig. 21: Identifying Screws And Heater - A/C System Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out programming/coding.

64 11 805 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR FRESH/RECIRCULATED-AIR FLAP

Necessary preliminary tasks:

• Remove instrument panel lower section

Disconnect plug connection (1).

Release screws (2) and remove servodrive (3).

Installation:

Make sure deflection levers are correctly seated.

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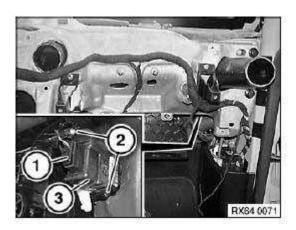


Fig. 22: Identifying Plug Connection And Servodrive Courtesy of BMW OF NORTH AMERICA, INC.

64 11 855 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR CENTRAL KINEMATICS

Necessary preliminary tasks:

• Remove carrier for instrument panel

Disconnect plug connection (1).

Release screws (2) and remove servodrive (3).

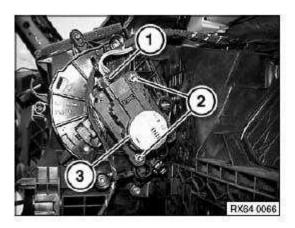


Fig. 23: Identifying Plug Connection And Servodrive Courtesy of BMW OF NORTH AMERICA, INC.

64 11 872 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR BLENDING FLAP

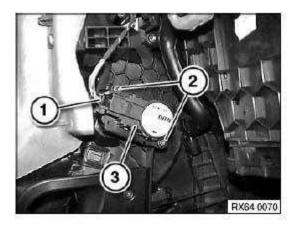
Necessary preliminary tasks:

• Remove instrument panel lower section

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Disconnect plug connection (1).

Release screws (2) and remove servodrive (3).



<u>Fig. 24: Identifying Screws And Servodrive</u> Courtesy of BMW OF NORTH AMERICA, INC.

64 11 942 REPLACING EVAPORATOR TEMPERATURE SENSOR (IHKR/IHKA)

Release screws (1) and feed out cover (2) towards bottom.

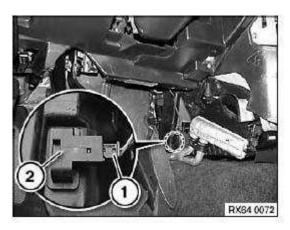


<u>Fig. 25: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Remove evaporator temperature sensor (2).

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<u>Fig. 26: Identifying Plug Connection And Evaporator Temperature Sensor</u> Courtesy of BMW OF NORTH AMERICA, INC.

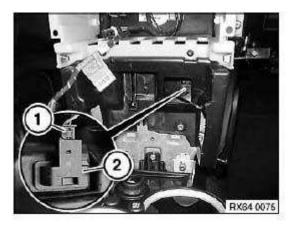
64 11 951 REPLACING TEMPERATURE SENSOR FOR HEATER

Necessary preliminary tasks:

• Remove center console trim

Disconnect plug connection (1).

Withdraw temperature sensor (2).



<u>Fig. 27: Identifying Plug Connection And Withdraw Temperature Sensor</u> Courtesy of BMW OF NORTH AMERICA, INC.

64 11 991 REMOVING AND INSTALLING/REPLACING SENSOR FOR AUTOMATIC RECIRCULATED AIR CONTROL

Necessary preliminary tasks:

• Remove right cowl panel cover

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Disconnect plug connection (1).

Unclip retaining notch (2) and turn sensor (3) in direction of arrow out of mounting.

Installation:

Make sure sensor (3) is correctly seated in locator.

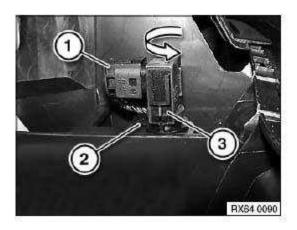


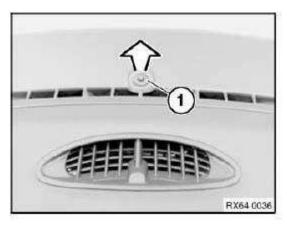
Fig. 28: Identifying Retaining Notch And Turn Sensor Courtesy of BMW OF NORTH AMERICA, INC.

64 11 992 REMOVING AND INSTALLING/REPLACING SOLAR SENSOR

Lever off trim (1) with a suitable tool.

Installation:

Make sure trim (1) is correctly seated.



<u>Fig. 29: Identifying Trim</u> Courtesy of BMW OF NORTH AMERICA, INC.

Lever out solar sensor (1) with a suitable object and disconnect associated plug connection.

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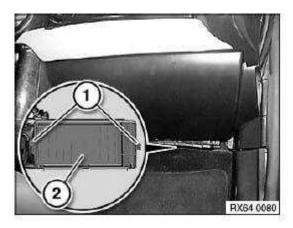


Fig. 30: Identifying Solar Sensor Courtesy of BMW OF NORTH AMERICA, INC.

31 MICROFILTER

64 31 009 REPLACING MICROFILTER FOR INTERIOR VENTILATION

If necessary, release screws (1) on cover (2).



<u>Fig. 31: Identifying Screws On Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release catches (1) and fold cover (2) downwards.

Installation:

Ensure cover (2) is correctly seated.

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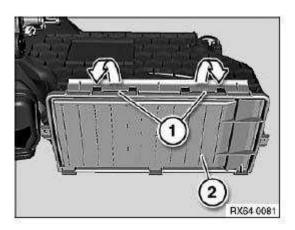


Fig. 32: Identifying Catches And Fold Cover Courtesy of BMW OF NORTH AMERICA, INC.

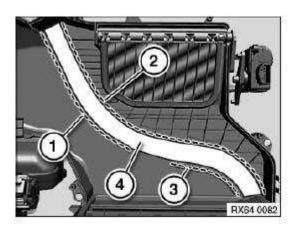
Pull microfilter (4) out of guides towards bottom.

Installation:

Feed in microfilter (4) between guides (1 and 2).

Slide microfilter (4) over guide (3).

Make sure microfilter (4) is correctly seated on all guides.



<u>Fig. 33: Identifying Microfilter Over Guide</u> Courtesy of BMW OF NORTH AMERICA, INC.

50 AIR CONDITIONING SYSTEM

64 50 ... AIR CONDITIONER TEST (R 134A)

Before A/C efficiency test, satisfy following conditions:

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- 1. Provide a MoDiC or DIS. Safeguard electrical system integrity by checking the fault memory (no faults in the fault memory).
- 2. Provide a thermometer with separate gauge.
- 3. Perform the test in a suitable work bay with an ambient temperature between 20°C and 30°C.

Re 1:

Connect MoDiC or DIS to car and display evaporator temperature.

Re 2:

Position a thermometer with a separate gauge approx. 5 cm below the roof liner at the height of the B-pillar. Lay gauge outwards out of vehicle interior.

Re 3:

Heating up vehicle interior:

- o A/C button is not activated during heating up.
- Close all windows and doors.
- Set recirculated air mode
- o Select air distribution mode for footwell and defrosting.
- Maximum temperature setting.
- o Maximum fan stage.
- o Run engine at approx. 2000 RPM until operating temperature is reached, then idle speed.

A/C efficiency test:

Turn on A/C compressor at a vehicle interior temperature of 50°C.

After 3-4 minutes, the evaporator sensor temperature must be > or $= 15^{\circ}$ C.

Draw off A/C system if this temperature is not reached. Measure amount of refrigerant drawn off.

If drawn-off quantity does not correspond to specified fill quantity: supplement refrigerant and repeat test.

If fill quantity is correct, continue troubleshooting by pressure measurement.

NOTE: A/C systems with uncontrolled compressors only: If necessary, then continue troubleshooting by pressure measurement.

64 50 ... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A

WARNING: Although R 134a at normal temperature is non-toxic, non-flammable and

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not explosive in air in any mixture ratio, it is still essential to follow various safety precautions.

The filled refrigerant circuit of the A/C system is subject to gauge pressure. When carrying out repairs on the A/C system, it is absolutely essential to draw off the refrigerant.

Do not weld or solder on filled A/C systems or in rooms into which R 134a may have leaked. Exposure to flames or high temperatures (< or = 50° C) may give rise to toxic decomposition products (fluorine gas). For this reason, do not smoke either.

R 134a must be drawn off, cleaned and returned to the A/C system with a service station following the relevant operating instructions.

Avoid all contact with liquid or gaseous R 134a. Wear protective goggles and gloves when working on the refrigerant circuit. R 134a acting on the skin can cause frostbite. Rinse affected body parts thoroughly with cold water. If R 134a gets into your eyes, likewise rinse with plenty of water and, if necessary, remove contact lenses if worn. Then seek immediate medical attention. Likewise seek immediate medical attention if you experience problems after inhaling R 134a fumes.

As a gas, R 134a is colorless, odorless and heavier than air. If it gets into the atmosphere, this may result especially in workshop pits in an imperceptible danger of asphyxiation or in cardiac palpitations. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

For a properly functioning A/C system, it is essential to have the greatest possible levels of cleanliness when working on the A/C system and the best possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the A/C system.

R 134a absorbs moisture very easily. Therefore seal off opened pipes, condenser, evaporator, compressor and drier bottle immediately with plugs.

With replacement parts, the plugs may only be removed immediately before the lines are connected.

In the event of warranty claims, the old parts must be provided with plugs to be able to determine the cause of the damage.

If an A/C system has been completely drained by leakage, accident or repair, the drier element must be replace as excessive moisture may have entered the system.

Store filled pressurized refrigerant bottles in such a way that they are not exposed to direct sunlight or other heat sources (max. 45°C). Also avoid exposing them to mechanical stress (e.g. by dropping).

In the event of fire, carbon dioxide (CO2), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishers. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

IMPORTANT: After each refill of an A/C system, check that protective caps of filling valves are hand-tight. They serve as additional seals.

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64 50 ... INSTRUCTIONS FOR HANDLING REFRIGERANT OIL (FOR REFRIGERANT R 134A)

WARNING: Observe the following points when handling refrigerant oil:

- Wear protective goggles.
- Wear gloves made from impermeable plastic.
- Do not swallow.
- Do not inhale.

Action to be taken after contact with refrigerant oil:

- After contact with eyes, rinse thoroughly with plenty of water and take out contact lenses (if worn). Then seek immediate medical attention.
- After contact with the skin, wash body parts affected with plenty of soap and water.
- Do not induce vomiting if oil is swallowed, seek immediate medical attention.
- If inhaled, introduce the person affected to fresh air. Seek medical attention if problems persist.

WARNING: Refrigerant oil is non-combustible and non-explosive at normal temperatures. In spite of this, the following precautions must be observed:

- Do not store in the vicinity of flames, heat sources or strongly oxidizing materials.
- Suitable extinguishers: carbon dioxide (CO₂), dry extinguisher, foam.

IMPORTANT: Refrigerant oil is hygroscopic and must therefore be stored in suitable containers that are sealed airtight!

Recycling:

Dispose of drawn-off refrigerant oil as hazardous waste.

Observe country-specific waste-disposal regulations.

Absorb escaping refrigerant oil with fluid-binding material.

Notify the relevant authorities if larger amounts of refrigerant oil are discharged into above-ground water supplies, drainage systems or subsoil.

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64 50 ... LEAK-TESTING WITH LEAK TESTER DEVICE

WARNING: Avoid contact with refrigerant.

Follow safety precautions when handling refrigerant.

Carry out leak-testing with a leak tester device from the workshop equipment catalog following the device manufacturer's operating instructions.

If leaks not to be localized are already identified during evacuation, the A/C system must nevertheless be filled. Then test for leaks with leak tester device.

NOTE: Refrigerant is heavier than air.

Therefore always conduct the leak test below the lines and components to be tested.

Shield lines and components against strong blasts of air (wind, drawing off).

Tighten down loose lines, mark leaks.

Then draw off draw off A/C system and seal off or repair leakage points.

Then refill A/C system and test for leaks.

64 50 ... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A

WARNING: Risk of injury!

Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts!

Draw off refrigerant without fail BEFORE all repair work on the refrigerant

circuit.

The refrigerant circuit is depressurized AFTER drawing off!

It is absolutely essential to read and observe the relevant operating

instructions for the A/C service unit used!

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

First aid measures:

- Eye contact: In the event of contact with the eyes, rinse immediately with plenty of running water and consult an opthalmologist.
- Skin contact: In the event of contact with skin, remove affected clothing immediately and rinse with

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plenty of water.

• After inhalation: If refrigerant vapors are inhaled in greater concentrations, remove the person affected to an area of fresh air and keep them under supervision. Consult a doctor. If breathing problems are experienced, breathe additional oxygen. If the person affected is breathing with difficulty or has stopped breathing, incline the person's head at the neck and administer the kiss of life.

64 50 009 DRAWING OFF, EVACUATING AND FILLING A/C SYSTEM (R 134A)

WARNING: Refrigerant circuit is under high pressure!

Repair work may only be carried out on a DEPRESSURIZED refrigerant

circuit!

Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant R 134a. Follow safety instructions for handling refrigerant oil.

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

NOTE: Draw off, evacuate and fill the A/C system in accordance with the operating

instructions of the relevant service station.

E60 only:

If necessary, to connect service station, use manufacturer's adapter for high-

pressure connection (red).

Instructions for drawing off A/C system:

To help separation of refrigerant and refrigerant oil, run engine at low speed (800-1200 RPM) and with A/C system turned on for a few minutes.

The limits the entrainment of refrigerant oil while it is drawn off.

Drawn-off refrigerant oil must be changed and reintroduced via the service station.

If at the end of the drawing-off procedure the service station moisture indicator shows that the drawn-off refrigerant is excessively moist, clean the refrigerant in accordance with the service station operating instructions.

Recycling:

Dispose of drawn-off refrigerant oil as hazardous waste.

Observe country-specific waste-disposal regulations.

Instructions for evacuating off A/C system:

The evacuation procedure removes all traces of ambient air, water vapor and any other gases present from the

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A/C system. This enables subsequent system filling with refrigerant.

A decrease in the vacuum level indicates a leak in the refrigerant circuit.

Instructions for filling A/C system:

Before filling with refrigerant, top up the refrigerant oil entrained during drawing off.

Follow instructions for opening and replacing parts in refrigerant circuit!

Depending on the type of component replaced on the A/C system, it may be necessary to top up the refrigerant oil, even if no measurable losses have occurred during drawing off. Read and comply with the A/C system manufacturer's notes in this regard and the operating instructions of the relevant service station.

Information on the required refrigerant fill quantity for the entire A/C system is contained on the rating plate (1) in the engine compartment.



Fig. 34: Identifying A/C System Diagnostic Display Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Reseal refrigerant filler necks on vehicle with sealing caps.

64 52 ... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- Avoid contact with refrigerant and refrigerant oil
- Follow safety instructions for handling R134a refrigerant
- Follow safety instructions for handling refrigerant oil

CAUTION:

- Always use new O-rings each time A/C connections are opened.
- Moisten O-rings with refrigerant oil prior to fitting

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Seal all parts to be returned at openings to prevent ingress of moisture or foreign bodies

I. Opening refrigerant circuit without part replacement, as preliminary work to further work

(e.g. engine removal):

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out main work
- Replace removed refrigerant oil with new refrigerant oil
- Evacuate and fill A/C system

II. Part replacement and part replacement on account of insidious leak

(minor leak, e.g. hairline crack)

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant oil with new refrigerant oil
- Additionally replenish new refrigerant oil in accordance with replaced parts:
 - o Compressor: refer to <u>HEATING AND AIR CONDITIONING TECHNICAL DATA 2007 HATCHBACK</u>.
 - o Evaporator: 10 ml
 - o Condenser: 10 ml
 - o Desiccant insert / desiccant bottle: 30 ml
 - o Each replaced refrigerant line: 10 ml
 - o Condenser with integrated dryer: 30 ml
 - o Safety pressure switch and seals: no additional refrigerant oil
- Evacuate and fill A/C system

III. Part replacement on account of sudden leak

(major leak, e.g. pipe break due to accident)

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant oil with new refrigerant oil
- Additionally replenish 25 ml new refrigerant oil and new refrigerant oil in accordance with

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replaced parts:

- Compressor: refer to <u>HEATING AND AIR CONDITIONING TECHNICAL DATA 2007 HATCHBACK</u>
- o Evaporator: 10 ml
- o Condenser: 10 ml
- o Desiccant insert / desiccant bottle: 30 ml
- o Each replaced refrigerant line: 10 ml
- o Condenser with integrated dryer: 30 ml
- o Safety pressure switch and seals: no additional refrigerant oil
- Evacuate and fill A/C system

51 AC HOUSING-EVAPORATOR

64 51 520 REMOVING AND INSTALLING OR REPLACING EXPANSION VALVE

Special tools required:

• 64 1 140

WARNING: Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant R 134a.

Follow safety instructions for handling refrigerant oil.

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

NOTE: If A/C system is opened for more than 24 hours: Replace desiccant insert for A/C system.

Necessary preliminary tasks:

- Draw off refrigerant from A/C system
- Remove suction filter housing.

Unscrew nut (1).

Disconnect refrigerant lines (2).

Installation:

Replace all sealing rings and moisten with suitable refrigerant oil prior to fitting.

Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007 HATCHBACK</u>.

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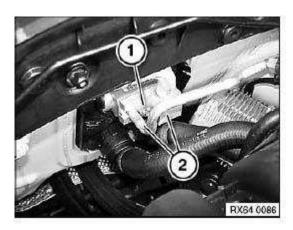


Fig. 35: Identifying Refrigerant Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and screw in special tool 64 1 140.

Release screw (2) and feed out expansion valve (3) towards front.

Installation:

Make sure expansion valve is correctly seated on seal.

Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007</u> HATCHBACK.

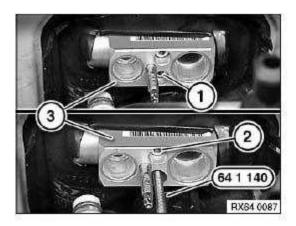


Fig. 36: Identifying Screw And Expansion Valve Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all sealing rings on twin pipes (2).

Coat sealing rings with suitable refrigerant oil prior to installation.

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Carefully insert expansion valve (1).

Grip retaining plate (3) with special tool 64 1 140 and secure expansion valve (1) with a screw.

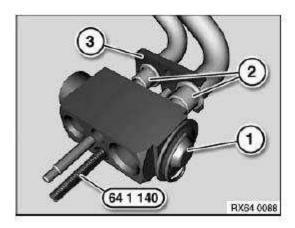


Fig. 37: Identifying Retaining Plate With Special Tool (64 1 140) Courtesy of BMW OF NORTH AMERICA, INC.

64 51 520 REMOVING AND INSTALLING OR REPLACING EXPANSION VALVE

Special tools required:

• 64 1 140

WARNING: Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant R 134a.

Follow safety instructions for handling refrigerant oil.

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

NOTE: If A/C system is opened for more than 24 hours: Replace desiccant insert for A/C system.

Necessary preliminary tasks:

- Draw off refrigerant from A/C system
- Remove suction filter housing.

Unscrew nut (1).

Disconnect refrigerant lines (2).

Installation:

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Replace all sealing rings and moisten with suitable refrigerant oil prior to fitting.

Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007 HATCHBACK</u>.

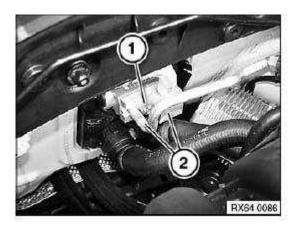


Fig. 38: Identifying Refrigerant Lines Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and screw in special tool 64 1 140.

Release screw (2) and feed out expansion valve (3) towards front.

Installation:

Make sure expansion valve is correctly seated on seal.

Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007</u> HATCHBACK.

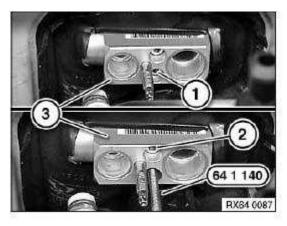


Fig. 39: Identifying Screw And Expansion Valve Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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Replace all sealing rings on twin pipes (2).

Coat sealing rings with suitable refrigerant oil prior to installation.

Carefully insert expansion valve (1).

Grip retaining plate (3) with special tool 64 1 140 and secure expansion valve (1) with a screw.

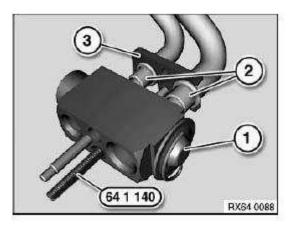


Fig. 40: Identifying Retaining Plate With Special Tool (64 1 140) Courtesy of BMW OF NORTH AMERICA, INC.

64 52 ... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- · Avoid contact with refrigerant and refrigerant oil
- Follow safety instructions for handling R134a refrigerant
- Follow safety instructions for handling refrigerant oil

CAUTION:

- Always use new O-rings each time A/C connections are opened.
- Moisten O-rings with refrigerant oil prior to fitting
- Seal all parts to be returned at openings to prevent ingress of moisture or foreign bodies

I. Opening refrigerant circuit without part replacement, as preliminary work to further work

(e.g. engine removal):

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out main work
- Replace removed refrigerant oil with new refrigerant oil
- Evacuate and fill A/C system

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II. Part replacement and part replacement on account of insidious leak

(minor leak, e.g. hairline crack)

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant oil with new refrigerant oil
- Additionally replenish new refrigerant oil in accordance with replaced parts:
 - Compressor: refer to <u>HEATING AND AIR CONDITIONING TECHNICAL DATA 2007 HATCHBACK</u>.
 - o Evaporator: 10 ml
 - o Condenser: 10 ml
 - o Desiccant insert / desiccant bottle: 30 ml
 - o Each replaced refrigerant line: 10 ml
 - o Condenser with integrated dryer: 30 ml
 - o Safety pressure switch and seals: no additional refrigerant oil
- Evacuate and fill A/C system

III. Part replacement on account of sudden leak

(major leak, e.g. pipe break due to accident)

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant oil with new refrigerant oil
- Additionally replenish 25 ml new refrigerant oil and new refrigerant oil in accordance with replaced parts:
 - o Compressor: refer to <u>HEATING AND AIR CONDITIONING TECHNICAL DATA 2007 HATCHBACK</u>.
 - o Evaporator: 10 ml
 - o Condenser: 10 ml
 - o Desiccant insert / desiccant bottle: 30 ml
 - o Each replaced refrigerant line: 10 ml
 - o Condenser with integrated dryer: 30 ml
 - o Safety pressure switch and seals: no additional refrigerant oil
- Evacuate and fill A/C system

52 COMPRESSOR

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64 52 ... INSTRUCTIONS FOR COMPRESSOR REPLACEMENT

IMPORTANT: Compressors with plastic belt pulleys:

- Avoid impacts/knocks to plastic belt pulley (caused by tools, contact with base).
- Return faulty compressors in their original packaging only.

IMPORTANT: When starting up a new compressor for the first time, it is absolutely essential to carry out the following breaking-in procedure:

- Switch on A/C system
- Set all air vents in instrument cluster to "OPEN"
- Start engine and let it stabilize at idle speed
- Set blower output to min. 75 % of max. blower output
- Switch on A/C system and run for at least 2 minutes at idle speed (risk of damage at higher speed!)

When evacuating the air-conditioning system, refrigerant oil is also extracted and collected in the oil separator of the service station.

After evacuation, the refrigerant must be filtered in the service station as the oil separator could still contain a liquid refrigerant/oil mixture. The filtering process gasifies the refrigerant completely and only the previously bound refrigerant oil remains in the oil separator. Measure and note down this quantity of refrigerant oil.

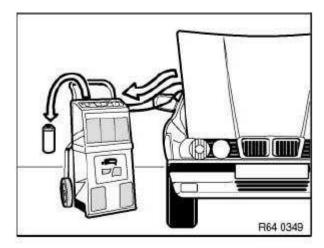
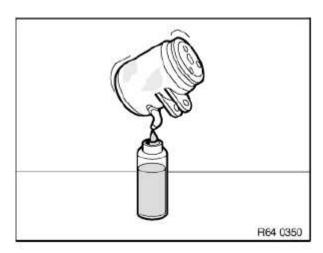


Fig. 41: Evacuating Refrigerant Oil Form Air-Conditioning System Courtesy of BMW OF NORTH AMERICA, INC.

Transfer the refrigerant oil remaining in the previous compressor via the filler plug completely into a measuring container.

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<u>Fig. 42: Transferring Refrigerant Oil Into Measuring Container</u> Courtesy of BMW OF NORTH AMERICA, INC.

Measure the amount of refrigerant oil collected from the previous compressor.

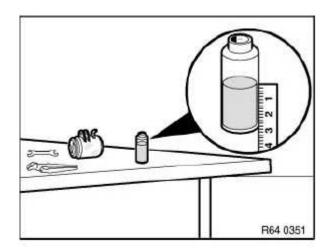


Fig. 43: Measuring Amount Of Refrigerant Oil Courtesy of BMW OF NORTH AMERICA, INC.

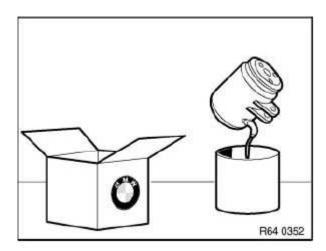
The new compressor is filled at the factory with refrigerant oil. Open filler plug and pour entire contents of compressor into a clean container.

Installation:

Replace sealing ring and moisten with refrigerant oil.

Observe tightening torque. Refer to $\underline{\text{HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007 HATCHBACK}}$.

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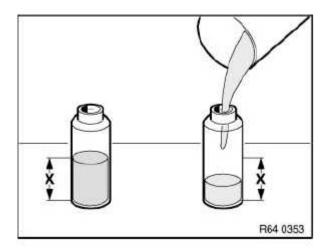
<u>Fig. 44: Pouring Refrigerant Oil Into Clean Container</u> Courtesy of BMW OF NORTH AMERICA, INC.

From the new compressor, pour the same amount of refrigerant oil (as drained from the previous compressor) + 10 g extra into a clean measuring container and pour again into the new compressor.

Remaining refrigerant oil can be poured into service station tank.

Otherwise the excess refrigerant oil must be disposed of correctly.

On account of its hygroscopic properties, refrigerant oil must not be stored in open containers.



<u>Fig. 45: Pouring Same Amount Of Refrigerant Oil Into Measuring Container</u> Courtesy of BMW OF NORTH AMERICA, INC.

The refrigerant oil drawn off from the oil separator of the service station and from the previous compressor must not be reused and must be correctly disposed of.

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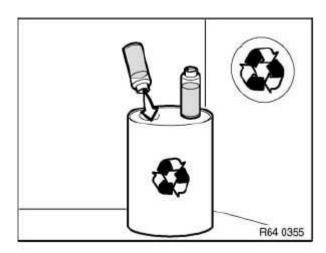
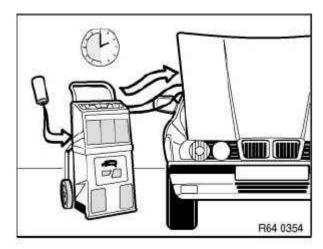


Fig. 46: Refrigerant Oil Drawn Off From Oil Separator Courtesy of BMW OF NORTH AMERICA, INC.

After installing the new compressor, it is essential before filling the A/C system to pour the same amount of the previously drawn off refrigerant oil into the system again.



<u>Fig. 47: Installing Refrigerant Oil Into Air-Conditioning System</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If A/C system is opened for more than 24 hours: Replace drier bottle/drier insert.

64 52 ... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- · Avoid contact with refrigerant and refrigerant oil
- Follow safety instructions for handling R134a refrigerant
- Follow safety instructions for handling refrigerant oil

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CAUTION:

- Always use new O-rings each time A/C connections are opened.
- Moisten O-rings with refrigerant oil prior to fitting
- Seal all parts to be returned at openings to prevent ingress of moisture or foreign bodies
- I. Opening refrigerant circuit without part replacement, as preliminary work to further work

(e.g. engine removal):

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out main work
- Replace removed refrigerant oil with new refrigerant oil
- Evacuate and fill A/C system
- II. Part replacement and part replacement on account of insidious leak

(minor leak, e.g. hairline crack)

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant oil with new refrigerant oil
- Additionally replenish new refrigerant oil in accordance with replaced parts:
 - Compressor: refer to <u>HEATING AND AIR CONDITIONING TECHNICAL DATA 2007 HATCHBACK</u>
 - o Evaporator: 10 ml
 - o Condenser: 10 ml
 - o Desiccant insert / desiccant bottle: 30 ml
 - o Each replaced refrigerant line: 10 ml
 - o Condenser with integrated dryer: 30 ml
 - Safety pressure switch and seals: no additional refrigerant oil
- Evacuate and fill A/C system

III. Part replacement on account of sudden leak

(major leak, e.g. pipe break due to accident)

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement

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- Replace removed refrigerant oil with new refrigerant oil
- Additionally replenish 25 ml new refrigerant oil and new refrigerant oil in accordance with replaced parts:
 - Compressor: refer to <u>HEATING AND AIR CONDITIONING TECHNICAL DATA 2007 HATCHBACK</u>.
 - o Evaporator: 10 ml
 - o Condenser: 10 ml
 - o Desiccant insert / desiccant bottle: 30 ml
 - o Each replaced refrigerant line: 10 ml
 - o Condenser with integrated dryer: 30 ml
 - o Safety pressure switch and seals: no additional refrigerant oil
- Evacuate and fill A/C system

64 52 520 REMOVING AND INSTALLING/REPLACING COMPLETE A/C COMPRESSOR (N12)

WARNING: Danger of injury!

Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant R 134a.

Follow safety instructions for handling refrigerant oil.

Scalding hazard!

Work on the exhaust system may only be carried out when it has cooled

down.

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

Read and comply with notes on replacing compressor.

If A/C system is opened for more than 24 hours:

Replace desiccant insert for A/C system

Necessary preliminary tasks:

- Drawing off, evacuating and filling the A/C system are not included in the time value given for this work operation
- Remove upper exhaust manifold heat shield
- Remove A/C compressor drive belt

IMPORTANT: Secure compressor against falling out.

Disconnect plug connection (1).

Release nuts (2) and disconnect refrigerant lines.

Tightening torque. Refer to **HEATING AND AIR CONDITIONING - TIGHTENING TOROUES - 2007**

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HATCHBACK.

Replace all sealing rings and moisten with refrigerant oil.

Release bolts (3) and feed out compressor.

Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

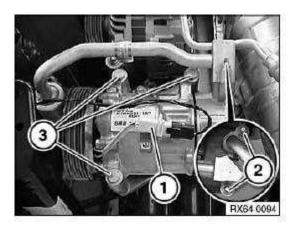


Fig. 48: Identifying Plug Connection And Bolts Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- If the A/C system has been opened for more than 24 hours, the desiccant insert must be replaced
- Evacuate and fill A/C system

53 CONDENSER AND DRYER

64 52 ... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- Avoid contact with refrigerant and refrigerant oil
- Follow safety instructions for handling R134a refrigerant
- Follow safety instructions for handling refrigerant oil

CAUTION:

- Always use new O-rings each time A/C connections are opened.
- . Moisten O-rings with refrigerant oil prior to fitting
- Seal all parts to be returned at openings to prevent ingress of moisture or foreign bodies
- I. Opening refrigerant circuit without part replacement, as preliminary work to further work

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(e.g. engine removal):

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out main work
- Replace removed refrigerant oil with new refrigerant oil
- Evacuate and fill A/C system

II. Part replacement and part replacement on account of insidious leak

(minor leak, e.g. hairline crack)

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant oil with new refrigerant oil
- Additionally replenish new refrigerant oil in accordance with replaced parts:
 - Compressor: refer to <u>HEATING AND AIR CONDITIONING TECHNICAL DATA 2007 HATCHBACK</u>
 - o Evaporator: 10 ml
 - o Condenser: 10 ml
 - o Desiccant insert / desiccant bottle: 30 ml
 - o Each replaced refrigerant line: 10 ml
 - o Condenser with integrated dryer: 30 ml
 - o Safety pressure switch and seals: no additional refrigerant oil
- Evacuate and fill A/C system

III. Part replacement on account of sudden leak

(major leak, e.g. pipe break due to accident)

Work sequence:

- Draw off A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant oil with new refrigerant oil
- Additionally replenish 25 ml new refrigerant oil and new refrigerant oil in accordance with replaced parts:
 - Compressor: refer to <u>HEATING AND AIR CONDITIONING TECHNICAL DATA 2007 HATCHBACK</u>
 - o Evaporator: 10 ml
 - o Condenser: 10 ml

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- o Desiccant insert / desiccant bottle: 30 ml
- o Each replaced refrigerant line: 10 ml
- o Condenser with integrated dryer: 30 ml
- o Safety pressure switch and seals: no additional refrigerant oil
- Evacuate and fill A/C system

64 53 ... NOTES ON REPLACING DRIER BOTTLE OR DRIER INSERT

The drier bottle or drier insert does not have to be replaced at regular service intervals in a functioning, leakproof A/C system.

However, the drier bottle or drier insert must be replaced without fail in the event of:

- o fouling of the refrigerant by filings/shavings (e.g. when the compressor is clamped)
- o a leaking A/C system or loss of refrigerant
- o the refrigerant circuit being opened for a period exceeding 24 hours, e.g. during repair work.

64 53 515 REPLACING DESICCANT INSERT FOR A/C SYSTEM (N12, N14)

WARNING: Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant R 134a.

Follow safety instructions for handling refrigerant oil.

IMPORTANT: Risk of damage! Restart engine only when A/C system has been correctly filled.

Necessary preliminary tasks:

- Drawing off, evacuating and filling the A/C system are not included in the time value given for this work operation
- Remove condenser for A/C system

Remove protective cap (1).

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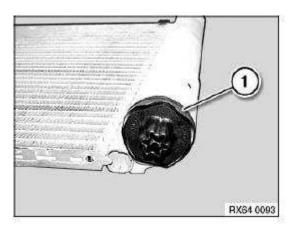


Fig. 49: Identifying Protective Cap Courtesy of BMW OF NORTH AMERICA, INC.

Remove circlip (1) and pull out desiccant insert (2).

Installation:

Replace all sealing rings and moisten with refrigerant oil.

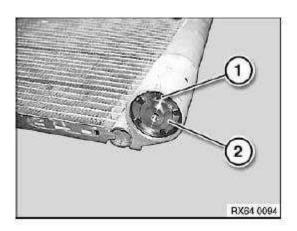


Fig. 50: Identifying Plug Connection And Bolts Courtesy of BMW OF NORTH AMERICA, INC.

64 53 520 REPLACING SAFETY PRESSURE SWITCH

WARNING: Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant R 134a. Follow safety instructions for handling refrigerant oil.

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

If A/C system is opened for more than 24 hours: Replacing drier insert for A/C

system

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Necessary preliminary tasks:

• Drawing off, evacuating and filling the A/C system are not included in the time value given for this work operation

Disconnect plug connection (1).

Unscrew safety pressure switch (2).

Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007</u> HATCHBACK.

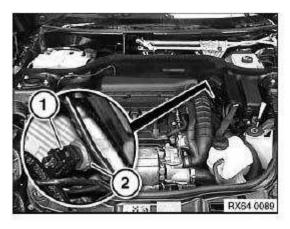


Fig. 51: Identifying Plug Connection And Safety Pressure Switch Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

• Evacuate and fill A/C system

64 53 550 REMOVING AND INSTALLING/REPLACING CONDENSER FOR A/C SYSTEM (N12, W16)

WARNING: Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant R 134a. Follow safety instructions for handling refrigerant oil.

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

If A/C system is opened for more than 24 hours:Replace desiccant insert for

A/C system

Necessary preliminary tasks:

• Drawing off, evacuating and filling the A/C system are not included in the time value given for this work

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operation

• Remove front bumper trim

Release bolts (1).

Disconnect pressure and suction lines.

Release screw (2).

Installation:

Replace all sealing rings and moisten with refrigerant oil.

Grip refrigerant lines when tightening screws!

Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007</u> HATCHBACK.

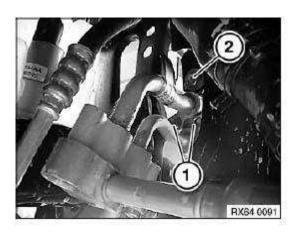


Fig. 52: Identifying Bolts And Screw Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Installation:

Tightening torque. Refer to <u>HEATING AND AIR CONDITIONING - TIGHTENING TORQUES - 2007</u> <u>HATCHBACK</u>.

Make sure brackets are seated correctly on condenser.

Lift out condenser (2).

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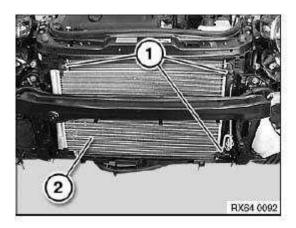


Fig. 53: Identifying Condenser And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

• Evacuate and fill A/C system

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Propeller shaft - Technical Data - Cooper

00 PROPELLER SHAFT, GENERAL

26 00 PROPELLER SHAFT IN GENERAL

PROPELLER SHAFT IN GENERAL - TECHNICAL DATA

Grease for slide		Molykote Longtherm 2	
Grease for constant velocity joint		Optimol	
Volume of grease for velocity joints	g	80	

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Rear axle - SI Techniques - Cooper

33 REAR AXLE

KINEMATIC DIAGNOSIS SYSTEM AND ENVIRONMENT

BMW KDS (Beissbarth)

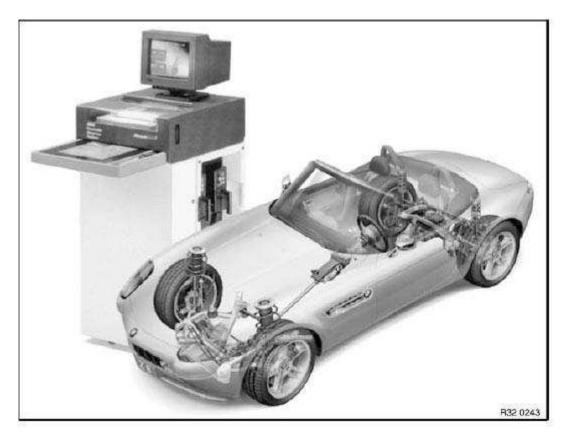


Fig. 1: BMW KDS (Beissbarth)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Foreword

1. Objectives

Wheel alignment has become an increasingly complex subject. The aim of this BMW Service Technology bulletin, therefore, is to achieve several objectives:

- $\circ\,$ Creation of guidelines for working with the BMW Kinematic Diagnosis System (KDS).
- o Familiarisation with wheel alignment technology for current vehicles and clarifying any questions which arise in this connection.
- o Transparency and clarification of different terms.

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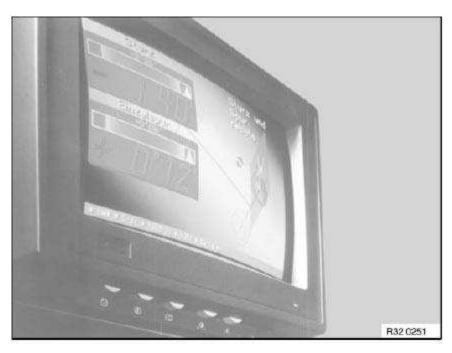
- o Clarification of the causes of errors in the past, such that they can be avoided after reading this document.
- o Creation of conditions for dealing safely with the BMW KDS.

2. Further development of the BMW Kinematic Diagnosis System

- The BMW Kinematic Diagnosis System is an integrated part of automotive system concepts. It ensures that work is carried out in a particularly rational manner which is appropriate for BMW requirements, such that you can also be certain of being prepared for future technological developments. As far as precision and performance in wheel alignment and tuning is concerned, BMW, together with leading manufacturers, has made the best of what is technically feasible: the BMW Kinematic Diagnosis System.
- The BMW Kinematic Diagnosis System manufactured by Beissbarth is more than just the further development of conventional wheel alignment equipment. It sets new standards in precision, performance, speed and handling. It is a guarantor for the perfection which BMW service customers rely on.
- Ride comfort, road safety and tyre wear depend to a large extent on the perfect interplay of the vehicle's kinematic functions. BMW is constantly launching new generations of chassis which are even better than their predecessors. This is why there are fewer kinematics system adjusting points and narrower tolerances when measuring and tuning the chassis.
- With the use of the multi-link rear suspension and the E36, the electronic wheel alignment devices are no longer suitable for BMW wheel alignment purposes. This applies to both the measuring procedure and measuring precision. The generation of equipment which was approved with the E36 series still fulfils all the requirements placed on a modern wheel alignment device, including the use of the latest computer technology.
- o Only BMW Kinematic Diagnosis Systems manufactured by Beissarth and Bosch may be used for wheel alignment.

3. Technical Data

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<u>Fig. 2: Displaying Technical Data On BMW Kinematic Diagnosis Systems</u> Courtesy of BMW OF NORTH AMERICA, INC.

TECHNICAL DATA DESCRIPTION CHART

1. Display	0	17" graphic screen with high-resolution graphics (640x480 pixels with 256 colours)
2. On-screen text	0	in the appropriate national language
3. Wheel dimensions	0	12"20"
4. Vehicle memory locations	0	unlimited
5. Rotating plates	0	Loadbearing capacity 1000 kg, angle of rotation ± 360°, 450 x 450 x 50 mm (L x W x H), sliding range ± 50 mm, weight 18 kg
6. Sliding plates	0	Loadbearing capacity 1000 kg, angle of rotation ± 10°, 450 x 450 x 50mm (L x W x H), sliding range ± 65 mm, weight 17 kg
7. Electrical connection	0	100115 V / 220240 V 50/60 Hz, 0.5 kW (other connections on request)

4. Scope of delivery

- 1 PC display device with graphic screen, graphical tablet, small or large equipment cabinet including automatic charging station, DIN A4 dot matrix printer
- 4 Measuring sensors with CCD camera technology and infrared data transmission with built-in power supply
- 1 Cable set (comprising 4 cables)
- 1 Brake clamping device

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- 1 Steering lock device
- 2 Electronic precision rotating plates with integrated sensor without access ramps
- 2 Sliding plates without access ramps
- 4 BMW quick-clamping units, comprising a P8-68 locating bell and P267 01 quick-acting clamp including coated holding claws
- 1 Operating instructions for BMW KDS (8 languages)
- 1 BMW software and the BMW vehicle setpoint data with setting screens as well as text for the measurement preparations

5. Accessories required

- 2 Locating rods for positioning the vehicle
- 1 Set of sand bags for the prescribed loading

6. Accessories recommended

- 4 Quick-clamping units
- 2 Sets of access ramps
- 1 Remote control / display
- 1 Trolley (for ballast bags, rotating and sliding plates and 4 quick-acting clamps)

2. Measuring options using the BMW Kinematic Diagnosis System

1. Front axle

- o Toe-in (single and total toe-in in relation to the geometrical drive axis)
- o Camber (with steering wheel pointing straight ahead)
- o Wheel displacement (in relation to the left-hand front wheel)
- o Castor, kingpin inclination and toe-differential angle

2. Rear axle

- Toe-in (single and total toe-in in relation to the longitudinal centre plane of the vehicle --> previously called symmetrical axis)
- o Geometrical drive axis
- o Camber

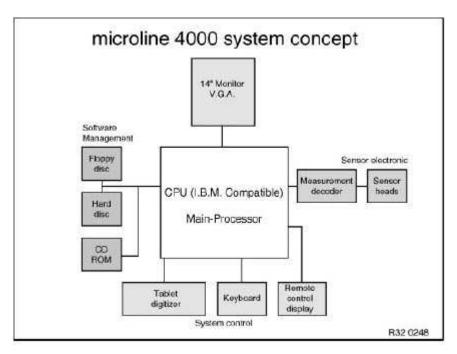
3. Other measuring options

- o Rear wheel displacement
- Wheelbase difference
- o Lateral displacement on right
- o Lateral displacement on left
- o Track difference
- Axial displacement

3. System description

1. BMW Kinematic Diagnosis System 1, based on the Beissbarth ML4000

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<u>Fig. 3: Microline 4000 System Concept</u> Courtesy of BMW OF NORTH AMERICA, INC.

The KDS 1 is available in two different designs at no extra charge:

1. Mobile workstation



Fig. 4: Mobile Workstation Courtesy of BMW OF NORTH AMERICA, INC.

2. Mobile compact cabinet

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Fig. 5: Mobile Compact Cabinet Courtesy of BMW OF NORTH AMERICA, INC.

The larger workstation offers a small storage area for accessories, whilst the compact cabinet is mobile and ideal for restricted working areas. Both variants can be supplied as a cableless measuring system (infrared). From the point of view of measuring technology, there is only a difference in the handling and equipping of the system. For both designs, the four measuring sensors are stored in integrated inserts with rechargeable battery charging points. When automatically charged over night, the measuring sensor batteries provide enough power for 10 hours of continuous use.

2. Computer

• The KDS 1 system comprises tested and reliable industrial components. The computer is an IBM-compatible, 32-bit Intel processor with CD ROM drive to the industry standard.



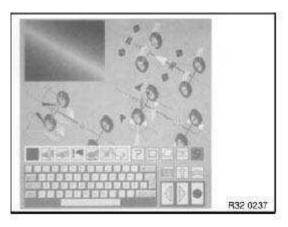
<u>Fig. 6: Computer</u> Courtesy of BMW OF NORTH AMERICA, INC.

3. Graphical tablet

o All functions are shown in graphical form on a "pictogram" panel. The panel is protected by a plexiglass cover. It can easily be replaced if more extensive design modifications are necessary. The operator interface has no membrane and is thus protected against damage.

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The main functions are activated by clicking the icon with the digital pen.



<u>Fig. 7: Graphical Tablet</u> Courtesy of BMW OF NORTH AMERICA, INC.

4. Equipment cabinet

 The PC with graphic monitor and removable operating panel, supports for the measuring sensors, the remote control and the A4 printer are integrated into the workstation. The charging station is located in the cabinet and can also be connected to the measuring sensors and the remote control using the plug-in cables (operating while simultaneously charging the batteries).

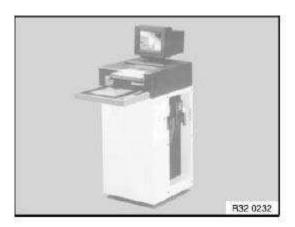


Fig. 8: Equipment Cabinet Courtesy of BMW OF NORTH AMERICA, INC.

5. Remote display

A cableless remote display can be supplied on request. The remote control keys are only active during measuring and adjustment (not for customer data input, or if selecting a vehicle or editing the setpoint data etc.). The following displays are supported by the remote control:

o Measured value with setpoint / actual comparison and tolerance bar

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- Steering graphics for steering routines
- o Live overview of the track / camber values with a setpoint / actual comparison
- o Rim run-out compensation



Fig. 9: Remote Display Courtesy of BMW OF NORTH AMERICA, INC.

6. Measuring sensors with CCD camera

The measuring sensors are each equipped for automatic measurement with two CCD cameras and their own processor for the cableless infrared transmission of data with integrated batteries.

Benefits:

- No temperature deviation
- Very high measuring resolution (the track could theoretically be measured in angular seconds)
- \circ Single track range of more than \pm 9 degrees for the constant display of toe-in when changing the tie-rod ends
- Exact system accuracy, i.e. when carrying out measurements at the vehicle following rim run-out compensation, the toe-in and camber measurements are accurate to 2 angular minutes



<u>Fig. 10: Measuring Sensors With CCD Camera</u> Courtesy of BMW OF NORTH AMERICA, INC.

7. BMW Quick-acting clamp

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o BMW quick-acting clamp for holding the measuring sensors precisely in position and measuring without rim run-out compensation.

NOTE: Any existing quick-acting clamps, e.g. from older F1600s or ML-3000s, must not be used on the BMW KDS.

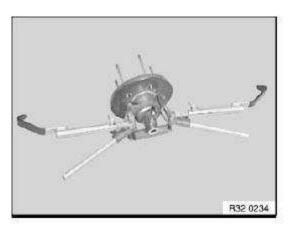


Fig. 11: BMW Quick-Acting Clamp Courtesy of BMW OF NORTH AMERICA, INC.

8. Rotating / sliding plates

- Electronic precision rotating plates for the front wheels with integrated sensor (360 degree measuring range)
- o Stable sliding plates for the rear wheels with a swivelling / rotating top plate
- o Accessories: Cover hood for aluminium rotating plates

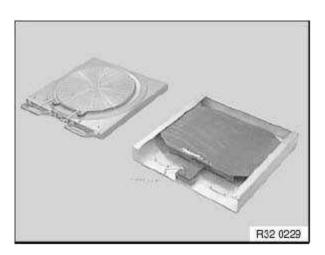


Fig. 12: Rotating / Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

9. Sensor pins

- A new BMW light alloy wheel (styling no. 18) has been available as optional equipment from April 1993. When measurements are being made on vehicles with these wheels, new sensor pins are required for the quick acting clamps of the recommended wheel alignment equipment.
- o The new sensor pins are included in the scope of supply for new deliveries of KDS 1 (order number: BS 90 19 11).

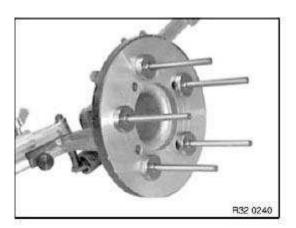


Fig. 13: Sensor Pins Courtesy of BMW OF NORTH AMERICA, INC.

10. Spoiler adapter

- o In the case of vehicles with very low spoilers, the sensor beam may be broken by the spoiler between the measuring sensors. This primarily occurs in front of the front axle.
- o The spoiler adapter is used here as a connecting element between the measuring equipment clamp and the measuring sensor. Thanks to the adapter, the sensors are placed 50 mm lower, thus allowing the sensor beam to move freely below the spoiler.

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R32 0241

Fig. 14: Spoiler Adapter Courtesy of BMW OF NORTH AMERICA, INC.

11. Quick-clamping units

- o Quick-clamping units for wheel alignment on non-BMW vehicles with rim run-out compensation.
- o Rims without sensors boreholes (rims for BMW vehicles from other manufacturers)

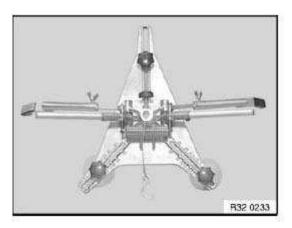


Fig. 15: Quick-Clamping Units
Courtesy of BMW OF NORTH AMERICA, INC.

12. Retainers

o The most varied clamping options for the measuring equipment are possible thanks to the versatile retainers and the rubber-coated thrust pieces, even on exotic light-alloy rims.

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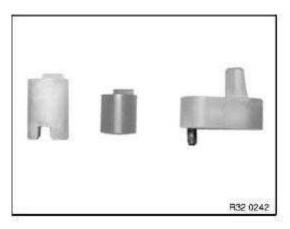


Fig. 16: Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

4. Workstation

1. Environment

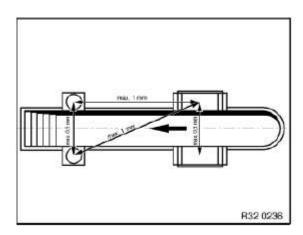
WORKSTATION ENVIRONMENT SPECIFICATION

Description:	Requirements:
	 Wheel alignment pits
ifting platforms currently recommended by BMW for wheel ment meet the requirements for the BMW KDS.	 Pillar-type lifts with set-down device
	 2 plunger-type lifting platforms with set- down device
	 Repair stands with set- down device
No particular requirements have to be met in respect of the location at which the BMW KDS is used. The measuring device can be	o One measuring area (approx. 4.5 m x 7.0 m).
installed over working pits or on lifting platforms.	 The rotating plates must be pinned to the platform

The support surfaces for the rotating and sliding plates may only display the following maximum height difference:

- o from left to right ± 0.5 mm
- o from front to back ± 1.0 mm
- \circ diagonally \pm 1.0 mm.

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<u>Fig. 17: Displaying Maximum Height Difference</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A difference in the height of the rotary plates of \pm 2 mm from left to right results in a measuring error of 4.8 ° in the camber.

As a comparison: The camber tolerance on the E36 is \pm 10'. The tyre tread difference or varying tyre pressure cause measuring errors of the same magnitude.

2. Preconditions for alignment

When carrying out the wheel alignment, the front and rear wheels must be centred on the rotating and sliding plates in order that all wheel suspensions remain free of tension during the steering routine and adjustment work. As a result, the rotating and sliding plates for the relevant wheel bases and track widths of the vehicle to be aligned must be moved.

3. Measuring tolerance

All measuring tolerances are system tolerances. This means that the sum of all individual tolerances gives the value shown in the example. Example of camber: Quick-acting clamp + measuring sensor + computer = 1' at a measuring range of \pm 3° (all BMW vehicles are within this measuring range).

4. Levelling the measuring station

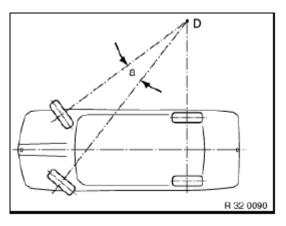
The manufacturers of the BMW KDS (Beissbarth / Bosch) are able to measure the measuring area to the required accuracy using levelling devices. Any "normal" water level is not suitable for this. Lifting platforms must be levelled under load so that the uneven deflection in the travel rails is taken into account.

IMPORTANT: Adjustment work for the lifting platform concerned must be executed by a specialist (manufacturer's after sales service).

5. Chassis-related terms

1. Toe-differential angle

- The toe-differential angle (a) is the angular position of the internal wheel on the curve in relation to the external wheel on the curve when driving round bends. The steering is designed such that the angular position of the wheels in relation to each other changes as the steering angle increases.
- o In ideal cases, the wheel axes meet at point D in any steering position (except for straight ahead).



<u>Fig. 18: Toe-Differential Angle</u> Courtesy of BMW OF NORTH AMERICA, INC.

2. Camber

o The camber is the angle of inclination of the wheel in relation to the vertical.

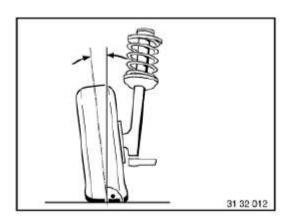
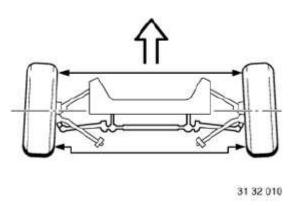


Fig. 19: Camber Courtesy of BMW OF NORTH AMERICA, INC.

3. Toe-in

o The toe-in is the reduction in the distance between the front of the wheels and the rear. The toe-in prevents the wheels from moving apart whilst driving (wobbling and grinding).



<u>Fig. 20: Toe-In</u> Courtesy of BMW OF NORTH AMERICA, INC.

4. Castor

• The castor is the kingpin angle seen from the side in the opposite direction of travel. The line through the centre of the spring strut mount and control arm ball joint corresponds to the kingpin.

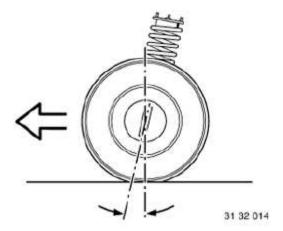


Fig. 21: Castor Courtesy of BMW OF NORTH AMERICA, INC.

5. Geometrical drive axis / symmetrical axis

- o (1) The geometrical drive axis is the line bisecting the angle of the overall rear wheel toe. The measurements of the front wheels relate to this axis.
- \circ (2) The symmetrical axis represents the centre line through the front and rear axes.

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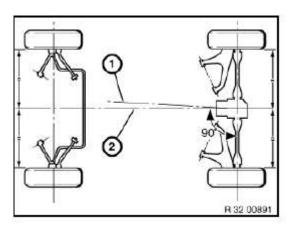
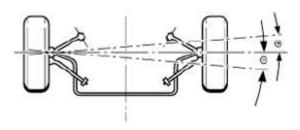


Fig. 22: Geometrical Drive Axis / Symmetrical Axis Courtesy of BMW OF NORTH AMERICA, INC.

6. Wheel displacement angle

o The wheel displacement angle is the angular deviation of the connecting line of the wheel contact points in relation to a line running at 90° to the geometrical drive axis. The wheel displacement angle is positive if the right hand wheel is displaced to the front, and is negative if it is displaced to the rear.



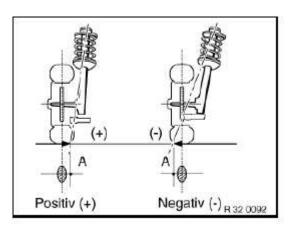
31 32 016

Fig. 23: Wheel Displacement Angle Courtesy of BMW OF NORTH AMERICA, INC.

7. Kingpin offset

 The kingpin offset is the distance from the centre of the wheel contact point to the contact point of the kingpin extrapolation.

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<u>Fig. 24: Kingpin Offset</u> Courtesy of BMW OF NORTH AMERICA, INC.

6. Wheel suspension

Those parts which connect the wheel to the mostly load-bearing floor elements of the bodywork and guide it in the required direction belong to the wheel suspension. They are connected by axles or other comparable structures and guided by the arms. The wheel suspension plays a decisive role in the handling characteristics of a vehicle. Two main groups have to be distinguished: 1. Rigid axle suspension and 2. Independent wheel suspension.

1. Rigid axle suspension

RIGID AXLE SUSPENSION SPECIFICATION

Description **Disadvantages** Advantages The rigid axle suspension has a rigid In the event of deflection connection between both wheels or Non-driven rear axles may taking place, there are no wheel pairs. Any change in one wheel is also acquire negative changes to the camber or camber as well as increasing more or less transferred to the other. It is wheel toe. This means: less tyre lateral guidance, thus now only fitted as a rear axle, if at all. tyre wear and good track increasing tyre wear. However it is frequently used for lorries stability. or busses.

2. Independent wheel suspension

INDEPENDENT WHEEL SUSPENSION SPECIFICATION

Description	Advantages	Disadvantages
axies. This development has its cause in mass inertia, as a reduction in the non-suspended mass improves wheel and ground contact, and the wheel stays better	independently from each other have no mutual influence on each other.	Depending on the type, changes may occur in the camber, wheel toe, track width, castor and wheelbase.

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some extent, are required for guiding independently suspended wheels.

7. Wheel alignment / procedure

1. Measuring options

An overview of all measuring options and values (VA = front axle, HA = rear axle) is shown below.

WHEEL ALIGNMENT MEASURING OPTIONS AND VALUES

Measuring options	Measuring accuracy	In measuring range	Total measuring range
Total wheel toe $(VA + HA)$	± 2'	± 2°	± 18°
Single wheel toe $(VA + HA)$	± 2'	± 2°	± 9°
Camber (VA + HA)	± 1'	± 3°	± 10°
Wheel displacement (VA)	± 2'	± 2°	± 9°
Geometrical drive axis	± 2'	± 2°	± 9°
Castor	± 4'	± 18°	± 22°
Kingpin inclination	± 4'	± 18°	± 22°
Toe-differential angle	± 4'	$\pm20^{\circ}$	± 20°
Maximum steering angle (VA)	± 4'	± 60°	± 300°
Maximum steering angle (HA)	± 4'	± 9°	± 9°
Castor correction range	± 4'	± 7°	± 10°

NOTE: The measuring accuracy details only apply when using the precision rotating and sliding plates as well as the BMW quick-acting clamps.

2. Preparatory work

Before commencing the measurement, preparatory work must be carried out at the measuring area and on the vehicle. Preparatory work includes:

- o Easy-running rotating and sliding plates
- o Aligning the rotating and sliding plates in relation to the track width and wheelbase
- o Centering the vehicle on the plates
- o Applying the parking brake
- o Removing the lock pins on the plates to prevent tension in the chassis under loading
- o Checking the rim and tyre size, tread depth, tyre pressure, steering wheel play, wheel bearings and condition of suspension and shock absorbers
- o Fastening the measuring equipment to the wheels
- o Loading the vehicle according to BMW KDS specifications

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- o Rock the vehicle firmly with the brakes released to ensure a stable centre position
- o Lock the service brake using the brake clamping device

3. Initial / final measurement

This measurement can be carried out as a program-guided measurement in the same way as any subsequent adjusting work and the final measurement. The sequence of the chassis measuring points to be called up is specified and controlled by the system software. The individual steps comprise:

- o Driving straight ahead to correctly record the wheel toe and camber values for the rear axle
- o Steering routine for recording the castor, kingpin inclination and toe-differential angle
- Recording the wheel toe and camber of the front axle (adjust the steering centre point in advance)
- Steering routine for measuring the maximum steering angle on the left/right
- Checking the overview of measured values with the setpoint and actual comparison of all measured values

4. Printing out the data

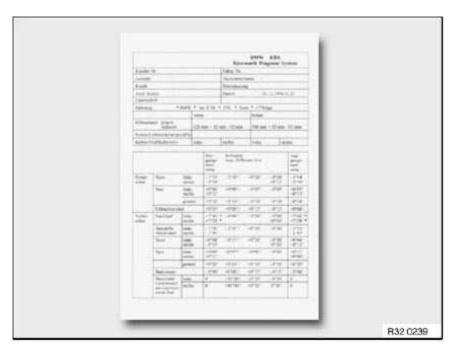


Fig. 25: Report Printout From Integrated DIN A4 Printer Courtesy of BMW OF NORTH AMERICA, INC.

The report printout from the integrated DIN A4 printer is subdivided into three sections:

- Header lines with customer and vehicle identification data --> the customer data entered before beginning the measurement as well as vehicle data are printed out here.
- o Centre section with vehicle data --> this includes the make, type, model and vehicle model

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year defined when the setpoint data record was selected. The values previously measured for height level, tyre pressure and tread depth are also printed in this section.

o The end section with all vehicle alignment values comprises the 3 columns initial measurement, setpoint values and output measurement. The measured values are recorded separately in these three columns.

8. Special features

1. Free wheel alignment

With free wheel alignment the selection and sequence of the measuring points is freely selectable. The following points must be observed for attaining the correct measurement results:

- o Carry out all work in the same way as with the program-guided measurement.
- o Before measuring the wheel toe and camber values for the rear axle, the steering must be in the "straight ahead" position to ensure that it is perfectly aligned in relation to the longitudinal centre plane of the vehicle.
- o Before measuring the single wheel toe values on the front axle, the centre of steering must be established to ensure the correct position of the steering wheel.

2. System settings

The following settings must only be entered or set once: language, display format, date/time, advertising text, remote control with display, rotating plate selection and printer settings. They remain stored

9. BMW Kinematic Diagnosis System comparison (Bosch - Beissbarth)

BMW KINEMATIC DIAGNOSIS SYSTEM COMPARISON (BOSCH - BEISSBARTH)

	Bosch	Beissbarth
Measured value recording	; Infrared	CCD camera
Data transmission	Cable	Infrared / cable
Measuring sensor power supply	Cable	Battery / cable
Remote control	Infrared	Infrared
Remote control with measured	Cable	Infrared
value display		
Setpoint data memory	Floppy disk	Hard disk
Measured value memory	Always the last vehicle measured	Unlimited vehicle memory
Operating system	-	MS-DOS
Languages	English and one language on request	EN, DE, NI, SV, IT, FR, SP (further languages can be called up)
Update	3.5" floppy disk	3.5" floppy disk using TIS/DIS
Monitor	20"	17"
Computer	-	Pentium

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Disk drives

2 x floppy disk

1 x floppy, 1 x CD ROM

10. Control modification (menu)

1. Remote control with display

The following steps show how the remote control with display is activated:

- 1. Call up the "Service" menu in special functions ("S" key)
- 2. Call up the "Remote control" sub-menu in the "Service" menu.
- 3. Select the "**Remote control with display** " item in the "**Remote control** " sub-menu this configuration is retained.

IMPORTANT: In the case of equipment without remote control, this must be configured to "No remote control".

2. Brief operating instructions

- 1. Activate the remote control with the "**ON**" button (it may also be switched on during alignment). The title page will appear on the LCD.
- 2. Select "Straight ahead " of the "Initial measurement ", "Adjustment work " or "Final measurement " at the measuring equipment cabinet. The steering graphics for "Straight ahead " will appear on the LCD.
- 3. Use the "Forward arrow" to change to the next measurement image. Display blocks will appear on the LCD with the designation of the measured value and tolerance bar with the measured value. If the measured value is within the tolerance range, it is shown in dark figures against a light background. If the measured value is outside the tolerance range, it will be shown in inverse video (light figures against a dark background).
- 4. By pressing the "F" key shortly, you can move alternately between the designation of the measured value and the setpoint value with the tolerance inside the display blocks.
- 5. You can scroll through the measured values using the "Forward arrow", "Backward arrow" and "Cancel" (red dot) keys. The function of these keys is identical to that of the keys on the graphics panel.
- 6. Even with "Free alignment", it is possible to scroll through the measured values in the same way as with "Program-guided alignment".
- 7. During measurement, the report print-out can be initiated using the "**Printer**" key. The remote control keys are only active during measurement and adjustment (not during customer data input, vehicle selection etc.).

3. Display support

- Measured values with a setpoint/actual comparison and tolerance bar (setpoint figures can be displayed with the "F" key)
- o Steering graphics for steering routines
- o Overview of measured values with current setpoint/actual comparison
- o Rim run-out compensation
- o With all other functions (e.g. customer input), the title illustration appears on the LCD

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display

NOTE:

If the data transmission from the remote control to the computer is interrupted, the remote control icon in the bottom right-hand corner of the screen changes colour from green to red and the illustration on the LCD display is shown inversely - black turns to white, white to black. This change does not take place in the title illustration. Once the line-of-sight connection has been re-established, the remote control continues to operate from the point of interruption in the program. A continuous visual connection during alignment is therefore not necessary.

- o The "Hour glass" icon in the LCD display means: " Please wait ".
- o The "Battery" icon in the top right-hand corner of the LCD display means that the battery reserve has been reached.
- o To switch off the remote control: press the "F" key for 5 seconds, then return it to its charging unit or connect it to a charge cable. The title illustration will again appear as a charging check.
- o If, during the measurement, the remote control has been placed back in the charging unit, it must be switched on again using the " **ON** " button.

11. Updating the software / setpoint data

Floppy disks will no longer be sent to BMW partners who have acquired a " **BMW KDS** (Beissbarth / Bosch)". For cost-related reasons, you can create these disks yourself on the "**DIS-tester**" or on the "**TIS/EPC server**". The data for this is regularly updated on the TIS CD.

1. Requirements

- o BMW KDS (Beissbarth / Bosch)
- o TIS CD program status (Beissbarth): from CD 12/95
- o EPC program status: from 12/95
- o TIS CD program status (Bosch): from CD 08/97
- o DIS program status: from V6.0
- o 3.5 " diskettes, 1.44 MB (Beissbarth 5 diskettes / Bosch 1 diskette)

2. Procedure (Beissbarth)

- 1. Go to the "Administration" screen
- 2. Select the **KDS** button
- 3. Select Beissbarth
- 4. Insert " **Diskette 1** " on request and confirm with "**OK** " (program diskette 1 of 2 is created, label it)
- 5. Insert "**Diskette 2** " on request and confirm with "**OK** " (program diskette 2 of 2 is created, label it)
- 6. Insert "**Diskette 3** " on request and confirm with "**OK** " (setpoint data diskette 1 of 3 is created, label it)

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- 7. Insert "**Diskette 4** " on request and confirm with "**OK** " (setpoint data diskette 2 of 3 is created, label it)
- 8. Insert "**Diskette 5** " on request and confirm with "**OK** " (setpoint data diskette 3 of 3 is created, label it)
- 9. Perform update and/or setpoint data on the KDS in the usual manner with the diskettes which have just been created.

3. Procedure (Bosch)

- 1. Go to the "Administration" screen
- 2. Select the **KDS** button
- 3 Select **Bosch**
- 4. Label "**Diskette 3.1** ", insert it into the drive on request and confirm with "**OK** " (2x) --> Setpoint data is copied to the diskettes.
- 5. Insert setpoint data diskette 3.1 into the 3.1 floppy disk drive, insert operating system diskette 3.0 into the 3.0 drive.
- 6. Switch on the machine in the usual manner.

IMPORTANT: When creating the KDS diskettes, all data on the diskettes used is overwritten.

NOTE: In the event of an error, a corresponding message is shown and the program is cancelled completely. The procedure must be run from

the beginning again and all data on the diskette will be deleted. A new diskette may have to be used.

12. Creating, copying and editing setpoint data

1. Copying

- o Press the "C" button and select the vehicle to be copied.
- Select the "Edit setpoint data" menu item from the special functions. Create a new vehicle
 in the usual manner. The setpoint values for the last vehicle selected will appear in the data
 input screen. Enter the data and save the data record.

2. Creating

o Press the "C" button and select the "Edit setpoint data" menu item from the special functions. Create a new vehicle in the usual manner. An empty data input screen will appear. Enter the data and save the data record.

3. Editing

o Factory-programmed setpoint data can neither be deleted nor modified. If this data does need to be modified, a new vehicle with modified setpoint data must be created. New vehicles created by the user are identified by a "+" in the selection menu. These vehicles can be deleted by the user using the "-" key or modified using the "<> " key. These keys only appear if vehicles have been entered by the user.

13. Special functions

1. Customer-specific printer report header

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The sub-item "Customer-specific text" must be called up in the "Special functions" menu. An input screen will appear on the monitor. This input screen must be filled out with the name and address and stored with the "S" screen key. The text entered is inserted into the report header.

2. Adjusting options

- o Call up the "Service" menu in the special functions ("S" key).
- Select the "Wheel toe adjustment" item or the "Camber adjustment" item from the
 "Adjustment" sub-menu. The toe and camber adjustment program will guide the user step
 by step through the adjustment using text and images. The measuring deviation for each
 measuring sensor will be shown on the screen when the adjustment has been completed.
- You can store the adjustment values in the measuring sensor using the " Store " key or you can quit the program with the " Red dot key " without saving them (check). The adjustment values can be printed out.

3. Rotating plate test

- o Call up the "Service" menu in the special functions ("S" key).
- \circ Call up the "**Rotating plate**" item in the "**Service**" menu. Turn the left-hand and right-hand rotating plate and check the display on the screen. Important: The measuring range is \pm 306 degrees.

4. Viewing and deleting customer entries from database

- o Call up the menu item " **Delete** " in the " **Database** " menu in the special functions. The data input screen will appear. Fill in the search fields with the data to be deleted.
- o Use the " " button to delete this data record. A new data record can then be highlighted and deleted with the digital pen.
- You can scroll through the entire database with the " **Arrow up** " and "**Arrow down** " keys.
- o You can quit the delete function by pressing the cancel key (red dot).

14. Modifications within program

Further modifications were carried out within the program which only slightly change the program sequence but which optimise the alignment in respect of comfort and speed. This is described below:

- o Optimisation of the rim run-out compensation in respect of speed.
- Optimisation of the steering routines: Highlighted values within the gate can still be corrected. The
 message "Rotating plates not connected" no longer causes the steering routine to be cancelled.
 Further measurements can be carried out after the rotating plates have been connected.
- o Standardisation of screen colours with the colours on the tablet.
- o Addition of texts in several foreign languages.
- o Elimination of program-related and cosmetic faults.
- o Electronic water level.
- o Omission of kingpin inclination measurement.

15. Faults

1. Tyre faults

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TYRE FAULTS

Fault	Effect
1 Wheel toe, camber, toe-differential angle and castor not correct1	Severe tyre squeaking even at relatively low speeds
2 Excessive toe-in and excessive positive camber	2 Tyres are worn down on one outside edge in the longitudinal direction
3 Excessive negative camber	3 Tyre wear on inside edge
4 Worn front-axle suspension on front-wheel-drive vehicles	4 Increased noise / Vehicle pulls on one side when accelerating
5 Incorrect wheel alignment	5 Wheels scrubbing / Tyre surface shows feathering in the tread
6 Play in the suspension due to mechanical parts (suspension, steering)	6 Washout / Wobbling of front wheels
7 Tyre pressure too low	7 Outside tyre surface wear

2. Front axle faults

3. Front axle faults

FRONT AXLE FAULTS

FRONT AXLE FAULTS		
Fault	Cause	Remedy
1. Toe deviation	a) Vehicle not in normal position	a) Correct height level
	b) Tie rod(s) bent	b) Replace tie rod(s)
	c) Tie rod ball joints worn	c) Replace tie rod(s)
	d) Rubber mount in control arm defective	d) Replace control arm
2. Camber deviation: The camber is fixed during the design stage and cannot be adjusted.	a) Rubber mount in control arm defective	a) Replace control arm
	b) Control arm deformed	b) Replace control arm
	c) Spring strut deformed	c) Replace spring strut
	d) Traction strut worn	d) Replace control arm
	e) Spring deflection too great	e) Replace coil spring, height level
	f) Front axle carrier deformed	f) Replace front axle carrier
	g) Spring strut mount deformed	g) Repair forward structure
	h) Distortion in the floor assembly (engine bracket)	h) Repair body
3. Castor deviation: The castor is fixed during the design stage and cannot be adjusted.	a) Rubber mount for tension / traction strut defective	a) Replace rubber mount
- and the second	b) Tension / traction strut deformed	b) Replace tension / traction strut
	c) Control arm deformed	c) Replace control arm

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	d) Spring strut deformede) Wheelhouse deformed (spring strut mount)	d) Replace spring strut e) Repair forward structure
	f) Distortion in the floor assembly (engine bracket)	f) Repair body
4. Toe-differential angle deviation	Requirement: camber and castor are correct	
	a) Tie rods unevenly adjusted	a) Set wheel toe on left and right to identical values
5. Wheel displacement deviation	Requirement: Front wheels have same single toe in relation to the geometrical axis	
	a) Front axle carrier deformed	a) Replace front axle carrier
	b) Engine bracket deformed	b) Repair body
	c) Control arm deformed	c) Replace control arm
	d) Tension / traction strut deformed	d) Replace tension / traction strut

4. Rear axle faults

REAR AXLE FAULTS

Fault	Cause	Remedy
1. Camber deviation	a) Vehicle not in normal position: spring deflection too great	a) Correct height level
	b) Rubber mount on rear axle carrier defective	b) Replace rubber mount
	c) Rear axle carrier deformed	c) Check rear axle carrier and replace, if necessary
	d) Control arm deformed	d) Check control arm and replace, if necessary
	e) Traction strut deformed	e) Check traction strut and replace, if necessary
	f) Distortion in the floor assembly	f) Repair body
	g) Swinging arm deformed	g) Replace swinging arm
2. Rear wheel position is not correct	a) Rear axle carrier has been shifted laterally	a) Check the rubber mounts on the rear axle carrier and replace, if necessary
	b) Distortion in the floor assembly	b) Repair body
3. Toe deviation	a) Vehicle not in normal position, i.e. spring deflection too great	a) Correct height level
	b) Rubber mount in rear axle carrier defective	b) Replace rubber mount
	c) Control arm deformed	c) Replace control arm

	d) Rubber mount and swinging arm defective	d) Replace swinging arm
	e) Rear axle carrier deformed	e) Check rear axle carrier and replace, if necessary
	f) Traction strut deformed	f) Check traction strut and replace, if necessary
4. Deviation from the geometrical drive axis	Requirement: Total wheel toe is correct	

a) Distortion in the floor assembly a) Repair body

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Further details on the "Kinematic Diagnosis System" can be found in the operating instructions for the BMW KDS (Beissbarth / Bosch).

Functional and system descriptions are not subject to change. Parts availability and immediate ordering availability cannot be derived from this information. The specialist departments will be providing further details at the relevant time.

GENERAL INFORMATION MINI - 2002-11

SERVICE INTERVAL REMINDER LIGHT RESET - PROCEDURE 2

Condition Based Service: The service interval indicator can be reset using the BMW DISplus (Service Functions, SIA reset). If the BMW DISplus is not available, using the trip odometer reset button in the instrument cluster can be used to perform reset procedure:

- 1. Switch ignition on.
- 2. Press the trip odometer reset button for approx. 10 seconds until the 1st service job appears in the LC display.
- 3. The upper display in the speedometer is illuminated by a service symbol (e.g.: an oil can denotes an oil change). The lower display in the speedometer indicates the time or distance remaining until the next service (e.g.: 14000). Press the on-board computer button repeatedly to scroll.
- 4. To reset, press and hold the on-board computer button on the direction indicator/main-beam switch until "RESET" appears in the lower display.
- 5. Pressing the on-board computer button again resets the service shown in the upper display.
- 6. Repeat the procedure for each additional service which is to be reset.

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00 GENERAL

72 SAFETY PRECAUTIONS AND GENERAL INFORMATION

SAFETY PRECAUTIONS AND GENERAL INFORMATION

Safety instructions	>	SAFETY REGULATIONS for handling airbag modules, airbag components and pyrotechnical seat belt tensioners		
	>	NOTES ON SCRAPPING vehicles with gas generators		
	>	DEACTIVATION/ACTIVATION PYROTECHNICAL COMPONENTS		
Handling electrical and electronic equipment	>	UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS		
	>	REPAIRING AIRBAG LEADS		
	>	HANDLING OPTICAL FIBRES		
Check	>	CHECK SEAT BELT		
	>	CHECKLIST FOR SEAT BELT		
Airbag system	>	Functional description and checking, refer to DIS		
	>	DEACTIVATING AIRBAGS		
	>	PROCEDURE AFTER AIRBAG TRIGGERING		

72 00 ... SAFETY REGULATIONS FOR HANDLING COMPONENTS WITH GAS GENERATORS

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

IMPORTANT: Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- o Head airbag (ITS, AHPS)
- Active knee protection
- o Active head restraint.

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Safety battery terminal (SBK)

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1.

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Disassembly and assembly

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
 - 30 minutes for vehicles up to 9/93;
 - 1 minute for vehicles from 9/93
- o In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- o Individual components must never be repaired. Instead, always replace them.
- o Do not treat airbag system components with cleaning agents or grease.
- o Components of the airbag system must not be exposed to temperatures in excess of 75°C.
- o Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- o Before installing, subject airbag system components (including electronic diagnostic components) to a visual inspection for damage and replace if necessary.
- o Airbag system components may only be electrically tested while they are installed and only with the BMW diagnostic system / DIS.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing upwards.

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Otherwise the generator will be thrown upwards if it is fired.

- o Do not point the firing pellet of a gas generator at other persons.
- o Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
 - Disconnect battery
 - Cover negative terminal (post)
- o Avoid all contact with the skin when removing a fired airbag module wear gloves. Wash with water after contact with the skin.

3. Transport

o Components with gas generators must be sent off in the packaging of the new components.

4. Storage

o Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

11 SEAT BELTS

72 11 ... CHECKING AUTOMATIC SAFETY BELT

General considerations when checking seat belts:

The seat belts must be checked after an accident.

For the check, you should start by trying to get information on which seats in the car involved in the accident were occupied. If this is not possible, check all the seat belts in the car and replace them if necessary.

In the event of deformations on the car, you must subject the components of the restraint system affected in this area such as e.g.

- Seat belt
- Seatbelt height adjustment
- o Belt buckle tensioner
- Triggering sensors
- o etc.

to a function check and a visual inspection.

If you are in any doubt as to the unimpaired functional capability of restraint system components, these components must be replaced in the interests of safety!

If a seat belt has to be replaced following an accident (e.g. in the event of a frontal and/or side impact with permanently deformed impact dampers/deformation elements or cross-members), the complete seat belt must be replaced! The complete seat belt comprises:

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- Top belt
- Lower strap
- Seat belt buckle (buckle tensioner)
- Seatbelt height adjustment
- o Retaining screws of all components

The following must also be checked and if necessary replaced:

- Seatbelt mountings on the car body
- Seatbelt mountings on the seat
- o seat runners.
- Seat structure (frame, etc.)

Alignment tests on the seat and the seat runners are not permitted!

The following explanations and the **CHECKLIST** for the automatic safety belt can provide help.

An unusable seat belt or a seat belt worn in a serious accident should be destroyed immediately after removal to guarantee that it cannot be used again.

Checking automatic reel and seatbelt strap:

The automatic reel has two independent activation systems for seat-belt locking.

The first activation system locks the automatic reel when driving quickly around curves, driving in tight curves, on extreme inclinations (vehicle rolls over) and during sharp braking or impact.

To check, the seat backrest must be placed in the upright position and both hands held in a supporting position close to the steering wheel. The brakes are then applied fully while driving on a dry surface and at a road speed equal to twice that of walking speed.

The seat belt must lock.

The second activation system provides additional safety and is controlled by inertia mass.

If the reel locks when the strap is pulled out suddenly, this system is also OK.

Automatic reel does not require servicing and must not be opened.

Precondition for complete, problem-free retraction of straps:

- o the straps must not be twisted!
- o the straps must not be damaged!

When placed to one side, the straps of the front seats must retract fully.

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With the straps in the rear seat bench, a small remaining loop is acceptable due to increased friction between the strap and the rear seat bench cover if:

o this remaining loop is fully retracted when the strap is reguided.

Belt straps should only be cleaned with a luke-warm soap solution or a commercial laundry detergent.

Belt straps must never be cleaned chemically or dyed.

The automatic reel and strap must be replaced in the event of:

- 1. creases
- 2. unravelling
- 3. pinches
- 4. cracks and tears
- 5. traces of melting
- 6. traces of wear on casing of seat belt tongue or on reversing clip.

Checking lower strap (belt buckle tensioner):

To fasten a seat belt, the tongue should insert easily and with a loud click in the lock.

When the "Red button" is pressed, the tongue must be ejected from the lock under spring pressure.

If the lock cover is missing or damaged, the lower strap must be replaced.

Replace the triggered belt buckle tensioner including the complete seat belt with seatbelt height adjustment and retaining screws and check the

- o Seatbelt mountings on the car body
- o Seatbelt mountings on the seat
- seat runners.
- Seat structure.

Criteria for a triggered mechanical belt buckle tensioner:

o very low position of seatbelt buckle (comparisons with new part).

Criteria for a triggered pyrotechnical belt buckle tensioner:

- o very low position of seatbelt buckle (comparisons with new part).
- o Airbag warning lamp permanently lit: read out airbag system fault memory.

The belt buckle tensioners can be triggered under certain circumstances even when the seat is not occupied. If it is definite that the belt system was not used (seat was not occupied), there is no need to replace the

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- o upper strap
- o attachment parts (belt height adjustment, screws)
- o seatbelt mountings on the car body
- o Seatbelt mountings on the seat
- o seat runners.

after a check.

72 11 ... INSPECTION LIST FOR AUTOMATIC SEAT BELT

AUTOMATIC SEAT BELT LIST

Was the automatic seat belt with lower strap replaced after an accident, e.g. frontal and/or oblique impact in which the impact absorbers/deformation elements were permanently deformed?	No	Replace complete automatic seat belt The following must also be checked and replaced, if necessary: seatbelt mountings on the car body seatbelt mountings on the seat seat runners.
Yes		
Does seat belt lock when pulled out suddenly?	No	Replace automatic seat belt (upper strap).
Yes		
Can the strap be pulled out without jamming?	No	Automatic reel is loose - tighten reel. If fault persists: Return spring broken - replace automatic seat belt (upper strap).
Yes		
Does the strap on the front seat belts retract automatically? Does the strap on the rear seat belts retract automatically, a small remaining loop is acceptable if this remaining loop is fully retracted when the strap is readjusted.	No	Automatic reel is loose - tighten reel. Excessive friction in belt guides - replace automatic seat belt (upper strap). Return spring broken - replace automatic seat belt (upper strap).
Yes		
Does automatic reel make a squeaking noise when belt is fastened or unfastened?	Yes	Excessive friction in belt guides - replace automatic seat belt (upper strap). Reel is loose - tighten reel. Return spring broken - replace automatic seat belt (upper strap).
No		
Is the plastic casing on the latch free from damage in the area of the belt opening?	No	Replace complete automatic seat belt
Yes		
Is the fully extended strap free from pinches, burn marks, tears and cuts,	No	Replace complete automatic seat belt

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folding and unravelling?		
Yes		
When the seat belt is fitted, is the latch ejected with spring pressure from the buckle when the "Red button" is pressed?	I	Replace complete automatic seat belt
Yes		
Does fastened seat belt lock when stopping vehicle quickly on a dry road at a road speed twice as fast as walking speed?	No	Replace complete automatic seat belt
Yes		
Is fully pulled-out belt free of serious dirt and other marks?	No	If dirt and marks cannot be removed with commercially available mild-action detergent, the automatic seat belt (upper strap) must be replaced.
Yes		
In the case of seat-integrated seat belts, is front tongue of reclining mechanism or seat rail free of deformation?	No	Replace both damaged parts and complete automatic-reel seat belt. The following must also be checked and replaced, if necessary: seatbelt mountings on the car body seatbelt mountings on the seat seat runners.
Yes		
The automatic seat belt is O.K.!		

72 11 022 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT SEAT BELT

Necessary preliminary tasks:

• Remove **REAR SIDE TRIM PANEL**

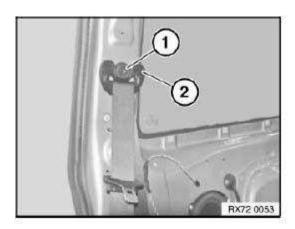
Release screw (1).

Remove reversing clip (2).

Installation:

Tightening torque: 72 11 03AZ . See **SEAT BELTS** for specs.

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<u>Fig. 1: Identifying Screw And Reversing Clip</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: 72 11 02AZ . See **SEAT BELTS** for specs.

Remove inertia reel mechanism (2).

Installation:

Inertia reel mechanism (2) is coded against incorrect installation (3).

Replace screw (1) and insert with Loctite.

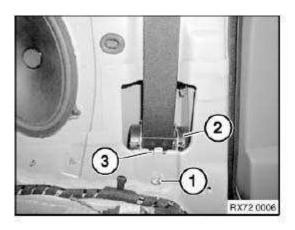


Fig. 2: Identifying Screw And Inertia Reel Mechanism Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: 72 11 04AZ . See **SEAT BELTS** for specs.

Installation:

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Replace screw and insert with Loctite.

Feed out anchor fitting from trim panel for door pillar (top)

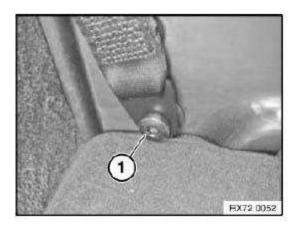


Fig. 3: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 041 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT LOWER BELT FITTING (SEAT BELT TENSIONER)

WARNING: Read and comply with <u>SAFETY REGULATIONS</u> for handling airbag modules and pyrotechnical belt tensioners.

Improper handling can lead to triggering of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off ignition!

Necessary preliminary tasks:

• Remove <u>LEFT OR RIGHT FRONT SEAT</u>.

Unfasten plug connection (3) and disconnect.

Lever retainer (4) out of seat mechanism.

Release screw (1).

Tightening torque: 72 11 09AZ . See **SEAT BELTS** for specs.

Installation:

Belt tensioner is coded against incorrect installation (2).

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Replace screw (1) and insert with Loctite.

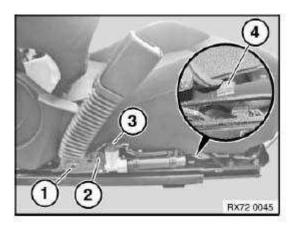


Fig. 4: Identifying Plug Connection And Retainer Courtesy of BMW OF NORTH AMERICA, INC.

Partially lever seat cover welt out of seat mechanism.

Unfasten plug connection (1) and disconnect.

Cut clip with cable tie.

Installation:

Replace faulty clip.

Unclip cable holder (2).

Feed wiring harness of belt tensioner out of seat mechanism.

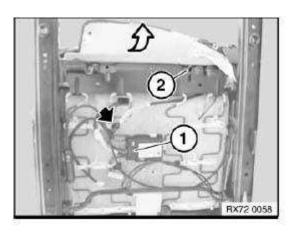


Fig. 5: Identifying Plug Connection And Cable Holder Courtesy of BMW OF NORTH AMERICA, INC.

72 11 092 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SEAT BELT

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Necessary preliminary tasks:

- Remove **REAR SEAT**
- Remove **C-PILLAR TRIM**
- Remove left or right wheel arch trim. See <u>REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM</u> and <u>REMOVING AND INSTALLING/REPLACING RIGHT LUGGAGE COMPARTMENT WHEEL ARCH TRIM</u>.

Release screw.

Tightening torque: 72 11 07AZ . See **SEAT BELTS** for specs.

Installation:

Replace screw and insert with Loctite.

Feed out anchor fitting through C-pillar trim.



Fig. 6: Identifying Screw Courtesy of BMW OF NORTH AMERICA, INC.

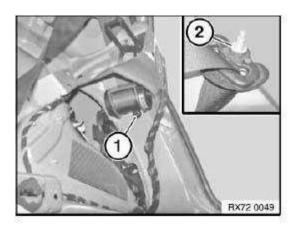
Release screw (1).

Tightening torque: 72 11 05AZ . See **SEAT BELTS** for specs.

Installation:

Replace screw (1) and insert with locking washer (2) and Loctite.

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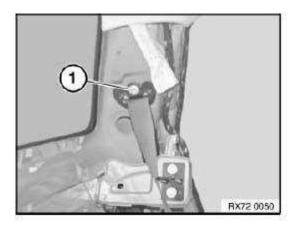
<u>Fig. 7: Identifying Screw With Locking Washer</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove belt deflection fitting.

Tightening torque: 72 11 06AZ . See **SEAT BELTS** for specs.

Installation:

Replace screws and insert with Loctite.

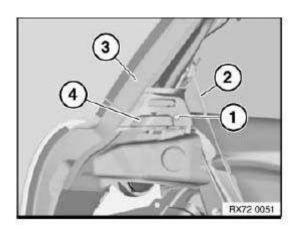


<u>Fig. 8: Identifying Screw And Belt Deflection Fitting</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Feed out belt (2) between body (3) and side trim panel (4).

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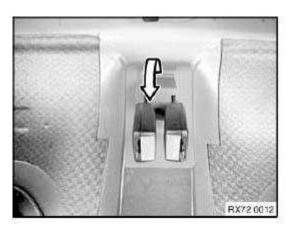
<u>Fig. 9: Identifying Screw And Side Trim Panel</u> Courtesy of BMW OF NORTH AMERICA, INC.

72 11 097 REMOVING AND INSTALLING/REPLACING REAR CENTRE LOWER BELT FITTING

Necessary preliminary tasks:

• Remove **REAR SEAT**

Lift off cover.



<u>Fig. 10: Lifting Off Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screw.

Installation:

Replace screw.

Tightening torque: 72 11 08AZ . See **SEAT BELTS** for specs.

Remove lower belt fitting.

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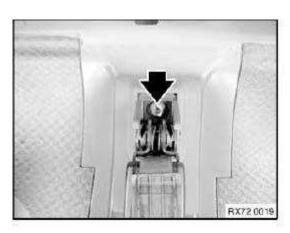


Fig. 11: Locating Screw
Courtesy of BMW OF NORTH AMERICA, INC.

12 AIRBAG GENERATOR-AIRBAG

61 00 ... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations:

Safety regulations for **HANDLING COMPONENTS OF AIRBAG SYSTEM**.

<u>INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY</u>.

Procedure for cable repair

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colours. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

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Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES.

REPAIRING A PLUG CONNECTION USING CONNECTORS.

INSTALLING AND REMOVING CONTACTS.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES.

REPAIRING A PLUG CONNECTION USING CONNECTORS.

INSTALLING AND REMOVING CONTACTS.

61 31 068 REMOVING AND INSTALLING/REPLACING SWITCH FOR PASSENGER AIRBAG DEACTIVATION

Necessary preliminary tasks:

- Disconnect battery negative lead
- Remove SIDE COVER FROM COVER FOR AIR OUTLET VENT ON RIGHT

Unlock catches (1) and remove switch for front passenger airbag deactivation (2) in direction of arrow out of cover for air outlet vent

Installation:

Make sure switch for front passenger airbag deactivation (2) is correctly seated on cover for air outlet vent.

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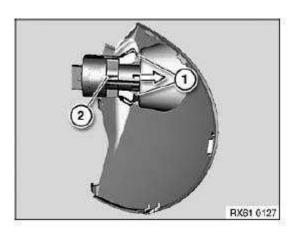


Fig. 12: Identifying Catch And Passenger Airbag Deactivation Courtesy of BMW OF NORTH AMERICA, INC.

72 12 ... DEACTIVATING FRONT PASSENGER AIRBAGS WITH KEY-OPERATED SWITCH

WARNING: The responsibility for deactivation/activation rests with the customer.

Depending on the occupation of the front passenger seat, the front passenger and side airbags must be (de-) activated in accordance with the Owner's Handbook.

The passenger airbag can only be deactivated in accordance with the following instructions if the vehicle is equipped with a suitable key-operated switch!

The key-operated switch can be retrofitted if it is missing and has been ordered as an optional extra.

Key-operated switch:

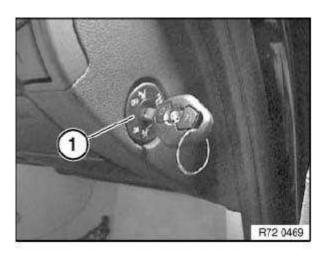
- Optional extra SA 5DA for MINI
- Optional extra SA 470 for BMW

The following airbags are deactivated simultaneously with the key-operated switch (1):

- Passenger airbag
- Side airbag (passenger side)
- If necessary, knee airbag in US models (passenger side)

The airbags can only be deactivated/reactivated while the vehicle is stationary and with the door open.

IMPORTANT: The head airbag remains active.



<u>Fig. 13: Identifying Key-Operated Switch</u> Courtesy of BMW OF NORTH AMERICA, INC.

Deactivation

1. Turn key-operated switch with ignition key to "OFF" position.

Deactivatable airbags on passenger side out of operation.

Head airbag on passenger side remains active.

All airbags on driver side remain active.

Activation

2. Turn key-operated switch with ignition key to "ON" position.

All the airbags in the vehicle are activated and are triggered in appropriate situations.

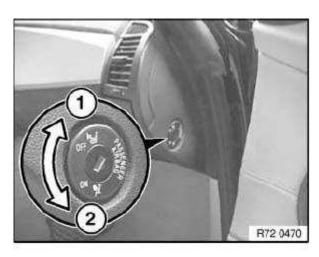


Fig. 14: Identifying Ignition Key Position

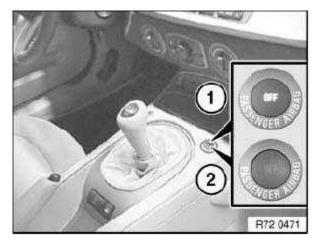
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Courtesy of BMW OF NORTH AMERICA, INC.

Warning lamp

When the ignition key is turned in the ignition lock, the function of the airbag system is checked and the warning lamp in the center console lights up for several seconds.

- 1. The warning lamp is permanently lit when the passenger airbags are deactivated
- 2. The warning lamp goes out after a few seconds when the passenger airbags are activated



<u>Fig. 15: Identifying Warning Lamp</u> Courtesy of BMW OF NORTH AMERICA, INC.

72 12 ... NOTES ON SCRAPPING VEHICLES WITH GAS GENERATORS (AIRBAG SYSTEM)

The gas generator is a pyrotechnical component and is for the most part permanently mounted on the following components:

- Airbag module
 - Driver's/passenger airbag
 - Side airbag
 - Head airbag (e.g. AHPS2)
 - Knee airbag
- o Belt tensioner
- Belt buckle tensioner
- o Safety battery terminal
- Active head restraint

In accordance with accident prevention regulations and specific national regulations, gas generators must be rendered unusable before they are scrapped. This is necessary because pyrotechnical objects can cause injury if improperly activated (e.g. scrapping with flame cutters).

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With vehicles which are scheduled for scrapping, it is always essential prior to draining and further stripping work to ensure that all the gas generators **in the vehicle** are fired. The fired gas generators can then be scrapped together with the vehicle.

Gas generators that have not fired constitute a hazard (also to the environment)!

Firing failure:

If correct firing is not possible, the relevant components must be removed and disposed of by special waste disposal companies!

Comply with **SAFETY REGULATIONS** for handling airbag system components.

If a firing operation has failed:

- o Disconnect the firing device from the battery and
- o Only approach the vehicle after a few minutes have elapsed

The components of an airbag system must always be disposed of. Such components must not be sold on as used parts.

Firing:

Firing of the gas generators may only be carried out by expert personnel and under the supervision of a responsible person. Other standard accident prevention regulations (safety goggles, ear defenders etc.) must also be observed.

The gas generators must be fired from the outside in this vehicle which has been earmarked for scrapping. In this process

- the doors must be closed
- o the rear lid must be open
- o the side windows must be open and
- o the sunroof must be open

To fire the gas generators, use the firing device with the appropriate cables (follow instructions).

WARNING: Once gas generators have been fired, observe a ventilation period of 10 minutes with the doors opened. Only then is it permitted to continue work inside the vehicle.

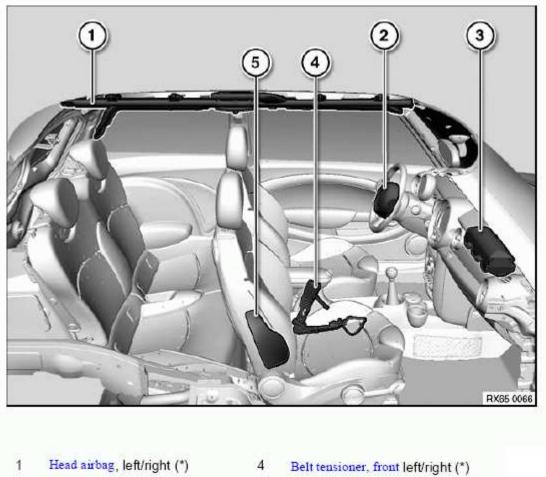
Wear protective goggles and protective gloves when handling a fired gas generator!

The burning of solid fuel will heat up the airbag unit - danger of burning hands!

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Wash skin with water after contact with fired gas generators!

72 12 ... OVERVIEW OF AIRBAG MODULES, AIRBAG CONTROL UNIT, BELT TENSIONERS



- 2 Airbag unit, driver side (*)
- 5 Side airbag, left / right (*)
- Airbag module, front passenger side (*)
- (*) Components contain pyrotechnical devices

Fig. 16: Overview Of Airbag Modules, Airbag Control Unit, Belt Tensioners Courtesy of BMW OF NORTH AMERICA, INC.

SAFETY PRECAUTIONS AND GENERAL INFORMATION

OVERVIEW OF SENSORS FOR AIRBAG SYSTEM

72 12 ... PROCEDURE AFTER AIRBAG TRIGGERING AS RESULT OF AN ACCIDENT

Check and/or replace following components after airbag triggering:

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Satellites (control unit + sensor)

- Components
 - Satellite, A-/B-pillar, left/right
 - Satellite, front door
 - Satellite, rear seat
 - Satellite, driver's/front passenger seat
 - Satellite, vehicle center
- o Procedure
 - Read out fault memory
 - Disconnect battery and observe waiting period
 - Rectify faults
 - Reconnect battery and observe waiting period
 - Clear fault memory
 - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. inside lights, radio, etc.)
 - Switch ignition on.
 - Clear fault memory and if necessary rectify faults

Cables and plugs

- Components and procedure
 - Check cables and plugs for damage, replace if necessary.

Belt system

- Components
 - Automatic safety belt tensioner
 - Belt buckle tensioner
 - Seatbelt height adjustment
- o Procedure
 - Check components, replace if necessary

Seats

- Components
 - Seat
 - Airbag module
 - Active head restraint
- Procedure

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- Check seats (function check of seat mechanism), replace if necessary
- Check seat screw/bolt connections
- Replace gas generator of active head restraint system

If the severity of the impact has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

External feature: The triggered head restraint is folded forwards and engaged.

The repair work can be carried out in the car with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

The gas generator can be replaced up to 5 times.

Replace airbag module and seat cover with padding

Driver's airbag

- Components
 - Airbag module
 - Steering wheel
 - Steering column (if damaged)
- o Procedure
- Check components, replace if necessary
- Replace steering wheel

Passenger airbag

- Components
 - Airbag module
 - Instrument panel trim
 - Supporting tube (if damaged)
- Procedure
 - Check components, replace if necessary

Side airbag, front/rear

- o Components
 - Airbag module
 - Door trim panel
 - Door in white
 - Seat

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- Procedure
 - Check components, replace if necessary

Head airbag (AHPS)

- Components
 - Airbag module
 - Trim, A-pillar
 - Roofliner
 - Trim, B-pillar (if damaged)
 - Trim, C-pillar (if damaged)
 - Bodyshell
- Procedure
 - Check components, replace if necessary

Knee airbag

- Components
 - Panel (driver's side)
 - Lower section of glovebox
 - Active knee protector (driver's and passenger sides)
- Procedure
- Check components, replace if necessary

Passive knee protector

- Components
 - Panel (driver's side)
 - Glovebox incl. knee protector (passenger side)
- Procedure
 - Check components for damage, replace if necessary
 - Check fastening elements

72 12 ... UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS

WARNING: <u>READ AND COMPLY WITH</u> safety regulations for handling airbag modules and pyrotechnical belt tensioners.

IMPORTANT: An airbag plug connection must be replaced if it is damaged.

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Following versions of plug connections on airbag module/gas generator are possible:

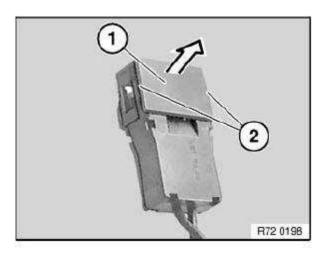
- o Airbag plug connection on gas generator/airbag module is offset by 90°
- o Airbag plug connection on gas generator/airbag module is straight (3 versions)

Airbag plug connection on gas generator/airbag module offset by 90°:

There are two ways of unlocking this airbag plug connection on the gas generator/airbag module:

Method 1:

Simultaneously pull cover (1) upwards at lugs on left and right (2).



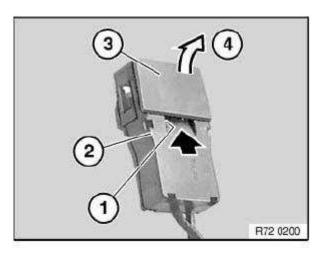
<u>Fig. 17: Pulling Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Method 2:

Insert a narrow screwdriver into recess (1) in housing (2).

Carefully prise cover (3) off (4).

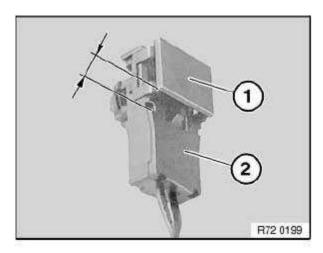
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<u>Fig. 18: Opening Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Cover (1) is not positioned higher than housing (2).

The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.



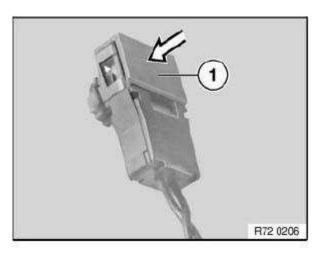
<u>Fig. 19: Identifying Cover And Housing</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

After attaching airbag plug connection to gas generator/airbag module, press cover (1) downwards until it rests flat on housing.

Check that it catches properly.

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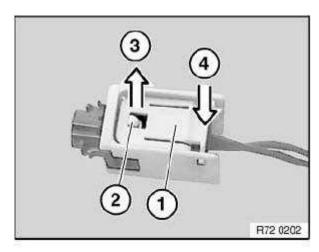
<u>Fig. 20: Pressing Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Airbag plug connection on gas generator/airbag module is straight (2 versions)

Version 1:

Press locking/unlocking plate (1) at edge (4).

Locking/unlocking plate (1) snaps upwards at opposite edge (3) and releases detent lug (2).



<u>Fig. 21: Pressing Locking/Unlocking Plate</u> Courtesy of BMW OF NORTH AMERICA, INC.

The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.

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Fig. 22: Identifying Airbag Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

After attaching airbag plug connection to gas generator/airbag module, check whether detent lug (2) is visible in opening of locking/unlocking plate (1).

Only if the detent lug (2) is visible will the airbag plug connection gas generator/airbag module be correctly engaged.

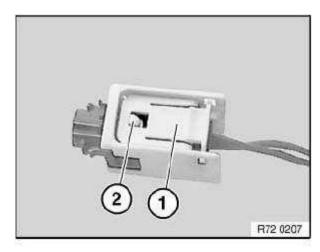


Fig. 23: Identifying Locking/Unlocking Plate And Detent Lug Courtesy of BMW OF NORTH AMERICA, INC.

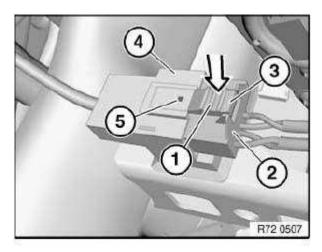
Version 2:

Press locking/unlocking plate (1) on edge (3) and pull plug (2) out of plug housing (4).

Installation:

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Only if the detent lug is visible in opening (5) will the gas generator/airbag module plug connection be correctly engaged.



<u>Fig. 24: Pressing Locking/Unlocking Plate</u> Courtesy of BMW OF NORTH AMERICA, INC.

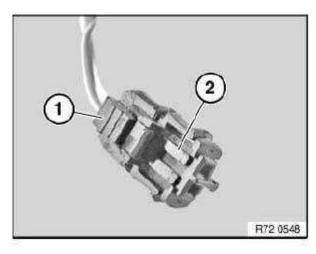
Version 3:

Press lock button (1) and pull out plug (2) up to initial engagement position.

Detach plug (2) from firing pellet.

Installation:

Insert plug connection in initial engagement position in gas generator/airbag module and engage in final engagement position.

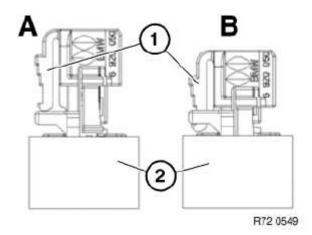


<u>Fig. 25: Identifying Plug And Lock Button</u> Courtesy of BMW OF NORTH AMERICA, INC.

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Illustration of version 3 with gas generator:

- A. Initial engagement position
- B. Final engagement position
- 1. Lock button
- 2. Gas generator



<u>Fig. 26: Identifying Lock Button And Gas Generator</u> Courtesy of BMW OF NORTH AMERICA, INC.

Version 4 - Crash-active head restraint:

Press locking clip at edge and disconnect plug (1).

Installation:

Check for correct engagement.

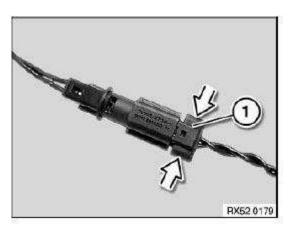


Fig. 27: Locating Plug Courtesy of BMW OF NORTH AMERICA, INC.

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72 12 000 REMOVING AND INSTALLING/REPLACING AIRBAG MODULE ON PASSENGER SIDE

WARNING: Read and comply with <u>SAFETY REGULATIONS</u> for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks:

• Remove INSTRUMENT PANEL UPPER SECTION TRIM

Unscrew nuts (1).

Installation:

Replace nuts.

Tightening torque: 72 12 01AZ . See <u>AIRBAG GAS GENERATOR</u>, <u>UNIT FOR PASSENGER SIDE</u> for specs.

Remove airbag module from instrument panel.

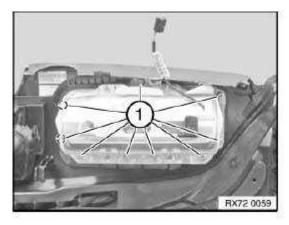


Fig. 28: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 050 REMOVING AND INSTALLING/REPLACING SIDE AIRBAG IN FRONT SEAT

WARNING: Read and comply with <u>SAFETY REGULATIONS</u> for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling may trigger the pyrotechnical seatbelt tensioner or side airbag and thereby cause injuries.

Switch off ignition!

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Necessary preliminary tasks:

- Remove **FRONT SEAT**
- If necessary, remove **REAR PANEL**
- Partially remove **BACKREST COVER**

Cut open cable tie (1).

Unlock plug (2) and pull out of plug housing.

Installation:

Replace defective cable tie.

Plugs are coded against incorrect installation.

Feed wiring harness out of holders (3).

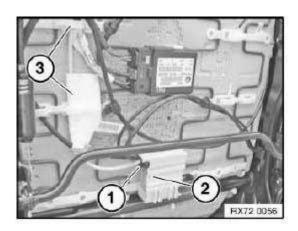


Fig. 29: Identifying Cable Tie And Plug Courtesy of BMW OF NORTH AMERICA, INC.

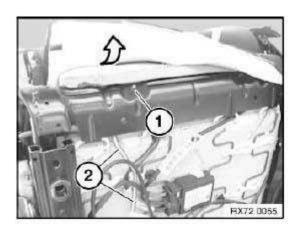
WARNING: Feed wiring harness carefully through seat and backrest frames owing to sharpness of edges.

Disengage seat cover welt from seat frame.

Unclip cable holder (1).

Feed wiring harness (2) out of seat and backrest frames.

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<u>Fig. 30: Identifying Cable Holder And Wiring Harness</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disengage welt on airbag side from backrest frame.

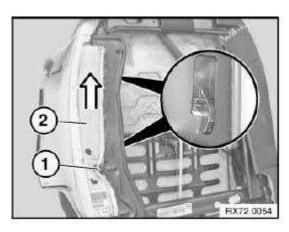
Release screw (1).

Tightening torque: 72 12 06AZ . See <u>AIRBAG GAS GENERATOR</u>, <u>UNIT FOR PASSENGER SIDE</u> for specs.

Disengage airbag module in cover pocket (2) from backrest frame.

Installation:

Cover pocket (2) must not be trapped between suspension hooks and backrest frame.



<u>Fig. 31: Identifying Cover Pocket And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Shown removed here for purposes of clarity.

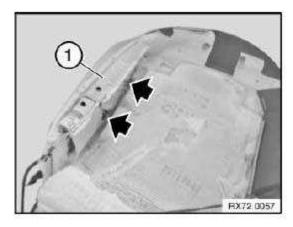
Pull airbag module downwards out of cover pockets (1).

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Installation:

Slide airbag module with suspension hooks up to opening in cover pocket.

Cover pocket (1) must not be damaged.



<u>Fig. 32: Identifying Cover Pocket</u> Courtesy of BMW OF NORTH AMERICA, INC.

72 12 060 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HEAD AIRBAG

WARNING: Read and comply with <u>SAFETY REGULATIONS</u> for handling airbag modules and pyrotechnical belt tensioners.

Improper handling can lead to triggering of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off ignition!

Necessary preliminary tasks:

- Remove **ROOFLINER**
- Disconnect negative battery cable

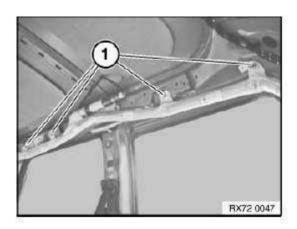
Release screws (1) for folding pack holder.

Tightening torque: 72 12 05AZ . See <u>AIRBAG GAS GENERATOR</u>, <u>UNIT FOR PASSENGER SIDE</u> for specs.

Installation:

Replace Torx screws and insert with Loctite.

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<u>Fig. 33: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unlock **PLUG CONNECTION** (1) and disconnect.

Release screws (2) and remove holder with gas generator.

Installation:

Replace Torx screws and insert with Loctite.

Gas generator is coded against incorrect installation.

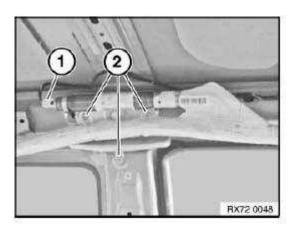


Fig. 34: Identifying Plug Connection And Screws Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure that folding pack cannot be installed twisted.

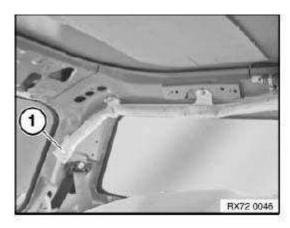
Folding pack must not be damaged.

Holders of folding pack must not be damaged.

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Installation:

Secure hole (1) of folding pack with clip from **C-PILLAR TRIM** to body.



<u>Fig. 35: Identifying Hole</u> Courtesy of BMW OF NORTH AMERICA, INC.

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2007 ACCESSORIES AND EQUIPMENT

Seats - Repair Instructions - Cooper

13 FRONT SEAT, NORMAL, MANUAL

52 13 ... REMOVING AND INSTALLING / REPLACING GUIDE FOR LEFT OR RIGHT FRONT SEAT HEAD RESTRAINT

Necessary preliminary tasks:

• Remove head restraint, see <u>52 13 390 Removing and installing or replacing front left or right head</u> restraint

Carefully press down backrest cover on left and right and expose detent lugs.

Press in detent lugs and lift out guide.

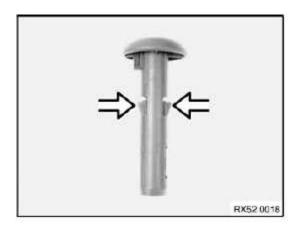


Fig. 1: Pressing Detent Lugs Courtesy of BMW OF NORTH AMERICA, INC.

52 13 ... REMOVING AND INSTALLING/REPLACING SEAT HEIGHT ADJUSTER ON LEFT OR RIGHT FRONT SEAT

Lever out cover (1) with plastic wedge.

Release screws (2) underneath and remove seat height adjuster.

Tightening torque: 52 13 08AZ, see 52 13 FRONT SEATS.

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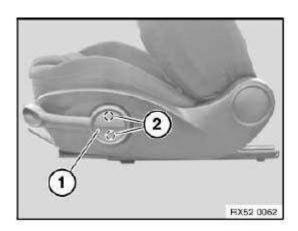


Fig. 2: Seat Height Adjuster
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 000 REMOVING AND INSTALLING DRIVER'S OR FRONT PASSENGER SEAT (NORMAL / MANUAL)

WARNING: Observe safety regulations for handling airbag modules and pyrotechnical seat belt tensioners, see <u>72 SAFETY PRECAUTIONS AND</u> GENERAL INFORMATION

Incorrect handling may trigger off pyrotechnical belt tensioners or the side airbag, which may result in injury.

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead

Slide front forward as far as it will go.

Release screws (1).

Installation:

Replace screws and insert with Loctite.

Tightening torque: 52 13 1AZ, see 52 13 FRONT SEATS.

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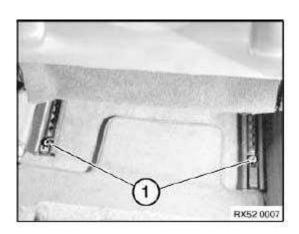


Fig. 3: Passenger Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slide front seat back as far as it will go.

Release screws (1).

Installation:

Replace screws and insert with Loctite.

Tightening torque: 52 13 1AZ, see 52 13 FRONT SEATS.

Unlock plug connections (2) and disconnect plug (3).

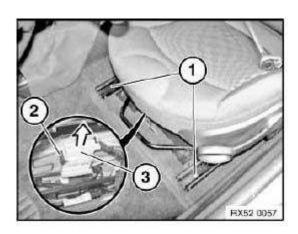


Fig. 4: Disconnecting Plug Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Cover entrance for protection purposes (risk of damage). Lift out front seat.

Installation:

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Carpet must not get between seat rails and floor pan near screw-fastening points (grating noises).

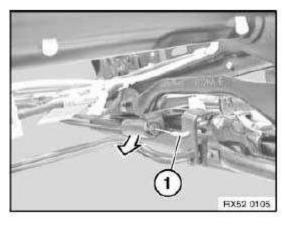
52 13 010 REMOVING AND INSTALLING/REPLACING BOTH SEAT RAILS ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks:

- Remove front seat, see <u>52 13 000 Removing and installing driver's or front passenger seat (normal / manual)</u>
- Seat height to stop
- Remove outer cover, see <u>52 13 043 Removing and installing/replacing outer cover on left or right front seat</u>

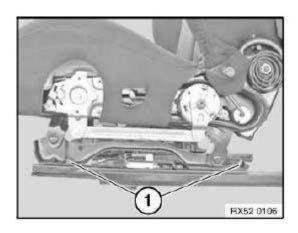
Disconnect Bowden cable (1).

Unclip Bowden cable sleeve from holder.



<u>Fig. 5: Disconnecting Bowden Cable</u> Courtesy of BMW OF NORTH AMERICA, INC.

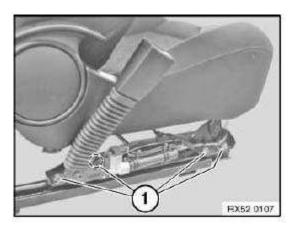
Release screws (1).



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<u>Fig. 6: Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).



<u>Fig. 7: Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Lever out locking clip.

Remove seat rail from adjusting bracket (1) and unlocking linkage (2).

Installation:

Unlocking linkage must rest on locking pawl.

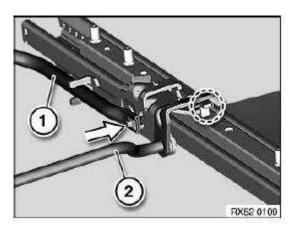


Fig. 8: Removing Seat Rail From Adjusting Bracket Courtesy of BMW OF NORTH AMERICA, INC.

Lever out locking clip.

Remove seat rail from adjusting bracket (1) and unlocking linkage (2).

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Installation:

Unlocking linkage must be attached to pin.

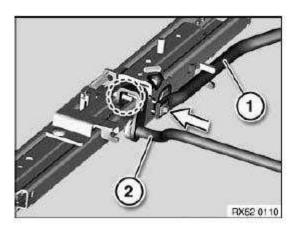


Fig. 9: Removing Seat Rail From Adjusting Bracket Courtesy of BMW OF NORTH AMERICA, INC.

52 13 020 REMOVING AND INSTALLING/REPLACING SEAT FRAME ON LEFT OR RIGHT FRONT SEAT

NOTE: This operation is described in section on:

- Removing backrest frame, see <u>52 13 030 Removing and installing/replacing backrest frame on front seat (manual/electric)</u>
- Removing seat fabric, see <u>52 13 400 Replacing seat cover on left or right front seat (normal/manual)</u>
- Remove both seat rails, see <u>52 13 010 Removing and installing/replacing</u> both seat rails on left or right front seat

If necessary, disengage springs (1) from seat frame.

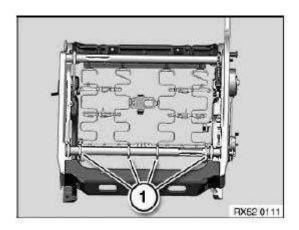


Fig. 10: Seat Frame Springs

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Courtesy of BMW OF NORTH AMERICA, INC.

52 13 030 REMOVING AND INSTALLING/REPLACING BACKREST FRAME ON FRONT SEAT (MANUAL/ELECTRIC)

Necessary preliminary tasks:

- Remove seat fabric, see 52 13 400 Replacing seat cover on left or right front seat (normal/manual)
- Remove backrest cover, see 52 13 405 Replacing backrest cover for left or right front seat

Unlock backrest and fold forwards completely up to stop pin.

This partially relieves tension on torsion spring.

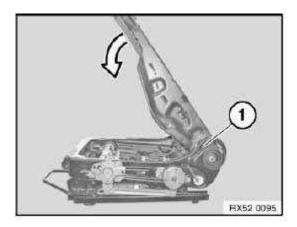


Fig. 11: Removing Seat Courtesy of BMW OF NORTH AMERICA, INC.

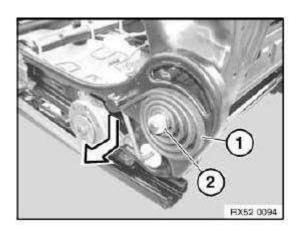
WARNING: Torsion spring is still under tension. Danger of injury!

Carefully disengage torsion spring (1) from pin with a pair of pliers.

Release screw (2) and detach torsion spring from axle pin.

Tightening torque: 52 13 6AZ, see 52 13 FRONT SEATS.

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<u>Fig. 12: Detaching Torsion Spring From Axle Pin</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disengage Bowden cable (1) from release mechanism.

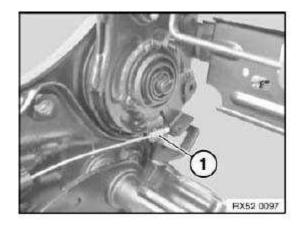


Fig. 13: Bowden Cable Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Replace screws and insert with Loctite.

Tightening torque: 52 13 3AZ, see 52 13 FRONT SEATS.

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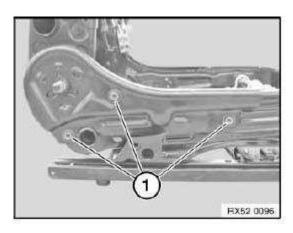


Fig. 14: Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove backrest frame (1) from seat mechanism (2).

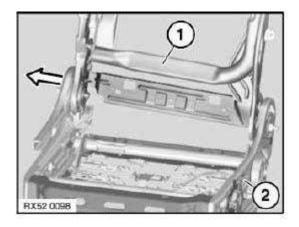


Fig. 15: Removing Backrest Frame From Seat Mechanism Courtesy of BMW OF NORTH AMERICA, INC.

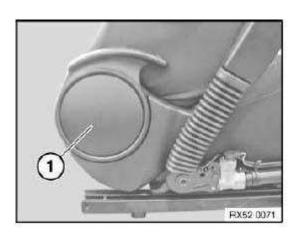
Replacement only:

If necessary, remove lumbar support, see 52 13 055 Removing and installing lumbar support on front seat.

52 13 031 REMOVING AND INSTALLING/REPLACING BACKREST ADJUSTMENT LEVER ON LEFT OR RIGHT FRONT SEAT

Lever out cover (1) with plastic wedge.

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<u>Fig. 16: Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unclip backrest adjuster (1) from square linkage.

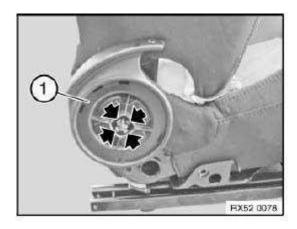


Fig. 17: Locating Unclip Backrest Adjuster Courtesy of BMW OF NORTH AMERICA, INC.

52 13 033 REPLACING RELEASE HANDLE ON LEFT OR RIGHT FRONT SEAT

NOTE: This operation is described in section on:

Remove actuating unit for left or right seat back release, see <u>52 13 036</u>
 Removing and installing/replacing actuating unit for left or right seat back release

52 13 036 REMOVING AND INSTALLING/REPLACING ACTUATING UNIT FOR LEFT OR RIGHT SEAT BACK RELEASE

Necessary preliminary tasks:

• Remove rear panel on rear seat backrest, see 52 13 198 Removing and installing/replacing rear panel

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on left or right front seat backrest (normal/manual)

Remove actuating unit (1) from backrest frame.

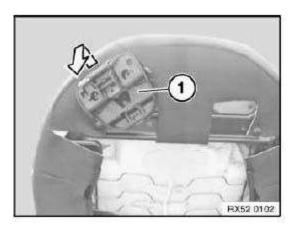


Fig. 18: Removing Actuating Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage Bowden cable (1) from actuating unit.

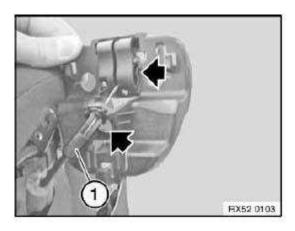


Fig. 19: Locating Bowden Cable Courtesy of BMW OF NORTH AMERICA, INC.

52 13 037 REMOVING AND INSTALLING/REPLACING BOWDEN CABLE FOR LEFT OR RIGHT SEAT BACK RELEASE

Necessary preliminary tasks:

• Remove actuating unit for seat back release, see <u>52 13 036 Removing and installing/replacing actuating unit for left or right seat back release</u>

Unclip holder (1) at Bowden cable from backrest frame.

Unclip end sleeve (2).

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Installation:

End sleeve must be felt to snap into place.

Feed out Bowden cable from backrest frame.

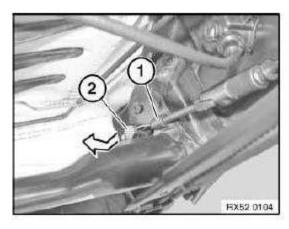


Fig. 20: Removing Sleeve Courtesy of BMW OF NORTH AMERICA, INC.

52 13 041 REMOVING AND INSTALLING/REPLACING INNER COVER ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks:

• Remove backrest adjuster from front seat, see <u>52 13 031 Removing and installing/replacing backrest adjustment lever on left or right front seat</u>

Pull pin (1) out of clip.

Lever out clip.

Installation:

If necessary, replace faulty clip.

Remove cover (2) in direction of arrow from seat frame.

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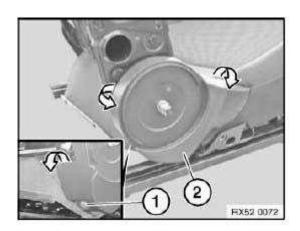


Fig. 21: Pulling Pin Out Of Clip Courtesy of BMW OF NORTH AMERICA, INC.

52 13 043 REMOVING AND INSTALLING/REPLACING OUTER COVER ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks:

• Remove seat height adjuster from front seat, see <u>52 13 ... Removing and installing/replacing seat height adjuster on left or right front seat</u>

Pull pin (1) out of clip.

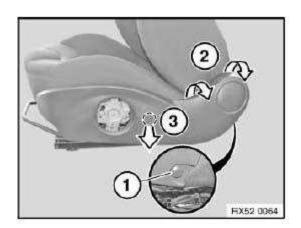
Lever out clip.

Installation:

If necessary, replace faulty clip.

Lift cover in area (2) over seat mechanism.

Unclip cover in direction of arrow (3).



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<u>Fig. 22: Pulling Pin Out Of Clip</u> Courtesy of BMW OF NORTH AMERICA, INC.

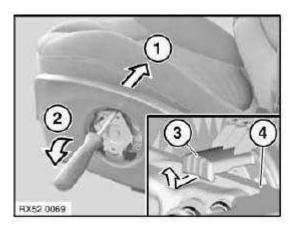
Disengage plastic hook (3) of cover as follows from seat mechanism (4):

Carefully insert screwdriver between cover and seat mechanism.

Press cover in direction of arrow (1).

At same time, press screwdriver downwards in direction of arrow (2).

Lift cover over seat mechanism.



<u>Fig. 23: Pressing Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Swing cover in direction of arrow and remove from seat mechanism.

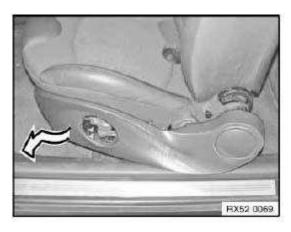


Fig. 24: Pressing Cover Courtesy of BMW OF NORTH AMERICA, INC.

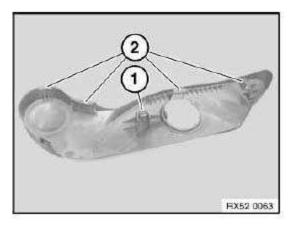
Retainer (1) must not be damaged and must be pre-installed.

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Cover must not be damaged at locating tabs (2).

Installation:

If necessary, replace faulty cover.



<u>Fig. 25: Retainer And Tabs</u> Courtesy of BMW OF NORTH AMERICA, INC.

52 13 055 REMOVING AND INSTALLING LUMBAR SUPPORT ON FRONT SEAT

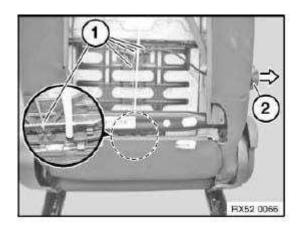
Necessary preliminary tasks:

• Remove rear panel on front seat, see <u>52 13 198 Removing and installing/replacing rear panel on left</u> or right front seat backrest (normal/manual)

Turn handwheel for lumbar support so as to produce the lowest possible lumbar vertebra support.

Disengage Bowden cable (1) from lumbar support.

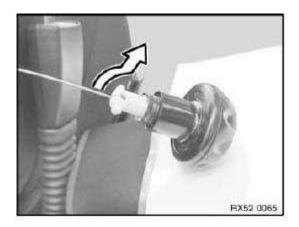
Detach handwheel (2) from backrest.



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<u>Fig. 26: Detaching Handwheel From Backrest</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disengage Bowden cable from handwheel.



<u>Fig. 27: Disengaging Bowden Cable From Handwheel</u> Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, remove counter-support (2):

Release screws (1) and remove counter-support (2).

Tightening torque: 52 13 04AZ, see 52 13 FRONT SEATS.

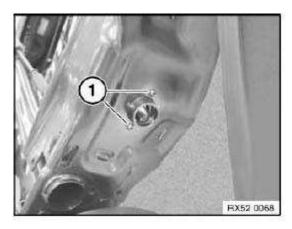


Fig. 28: Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage upper lumbar support (1) from wire spring frame.

Unclip lower lumbar support (2) from wire spring frame.

Feed lumbar support out of backrest.

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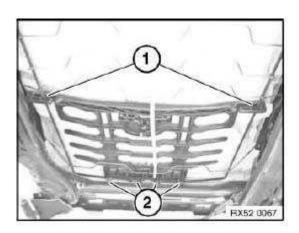


Fig. 29: Upper And Lower Lumbar Support Courtesy of BMW OF NORTH AMERICA, INC.

52 13 198 REMOVING AND INSTALLING/REPLACING REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST (NORMAL/MANUAL)

Raise release handle and release screw (1).

Tightening torque: 52 13 05AZ, see 52 13 FRONT SEATS.

Detach release handle.

Unfasten screws (2).

Tightening torque: 52 13 07AZ, see 52 13 FRONT SEATS.

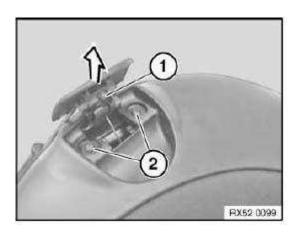


Fig. 30: Removing Release Handle Courtesy of BMW OF NORTH AMERICA, INC.

Reach between rear panel and backrest cover.

Unclip rear panel with a jerking action forwards from backrest frame.



<u>Fig. 31: Reaching Between Rear Panel And Backrest Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

52 13 390 REMOVING AND INSTALLING OR REPLACING FRONT LEFT OR RIGHT HEAD RESTRAINT

Press height adjuster (1) and pull out head restraint (2) up to stop.

Press lock (3) and pull out head restraint.

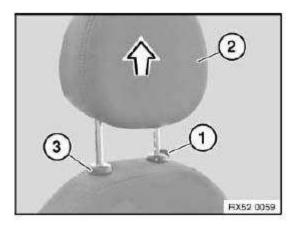


Fig. 32: Pulling Out Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 400 REPLACING SEAT COVER ON LEFT OR RIGHT FRONT SEAT (NORMAL/MANUAL)

Special tools required:

52 0 050 PLIERS

Necessary preliminary tasks:

• Remove front seat, see <u>52 13 000 Removing and installing driver's or front passenger seat (normal/manual)</u>

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- Remove inner cover, see <u>52 13 041 Removing and installing/replacing inner cover on left or right</u> front seat
- Remove outer cover, see <u>52 13 043 Removing and installing/replacing outer cover on left or right</u> front seat
- Remove seat belt tensioner, see <u>72 11 041 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT LOWER BELT FITTING (SEAT BELT TENSIONER)</u>

WARNING: US/CDN front passenger seat (with OC3 mat) only:

To avoid damaging the OC3 mat, it is essential to carry out the following operations with extra care.

When replacing seat cover:

If seat cover is defective, seat cover and padding with OC3 mat must be replaced together.

New seat cover is supplied with padding, OC3 mat and if necessary seat heating.

When replacing padding with OC3 mat:

If OC3 mat or padding is defective, both parts may only be replaced together.

These must be fitted with the seat cover from the car.

After fitting seat cover, enable OC3 mat with diagnosis system.

Enabling seat occupancy detector (OC3 mat):

- Connect diagnosis system
- Release seat occupancy detector
- Clear fault memory if necessary

Version with seat heating:

Unfasten plug connection (2) and disconnect.

Installation:

Plug is coded against incorrect installation.

Lever out clips (1).

Lever out welt in marked area of seat mechanism

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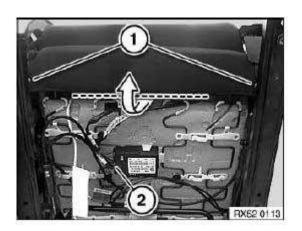


Fig. 33: Plug Connection And Clips Courtesy of BMW OF NORTH AMERICA, INC.

Lever out clips (1).

Lever out welt in marked area of seat mechanism.

Remove padding with seat cover from seat mechanism.

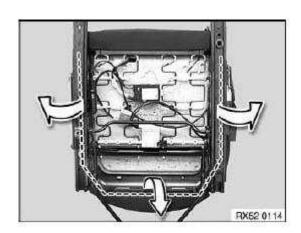


Fig. 34: Removing Padding With Seat Cover From Seat Mechanism Courtesy of BMW OF NORTH AMERICA, INC.

Version with OC3 mat:

o OC3 mat must not be kinked under any circumstances.

Detach all retainers in side area from longitudinal wires.

If necessary, depending on version, carefully take up seat cover and release clips from cross-wires.

Remove seat cover from padding.

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IMPORTANT: Remove all remnants of clips from seat cover and padding.

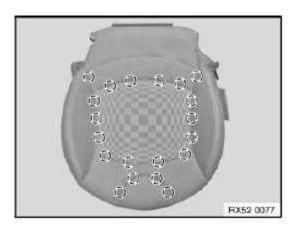


Fig. 35: Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Padding (1) with OC3 mat (2).

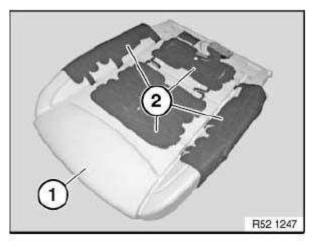
IMPORTANT: No retainer remainders may be fitted as well.

Handle OC3 mat with extreme care.

Do not kink OC3 mat.

Do not clamp OC3 mat.

OC3 mat must lie without folds under seat cover.



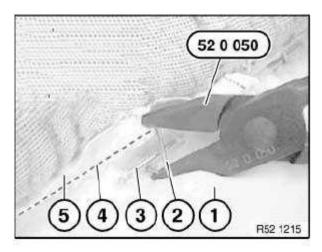
<u>Fig. 36: Padding With OC3 Mat</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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Insert new retainer (2) with special tool 52 0 050 and bend closed.

- 1. Padding
- 2. Retainer
- 3. Trim thread in padding
- 4. Trim thread in seat cover
- 5. Seat cover



<u>Fig. 37: Special Tool (52 0 050) On Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

52 13 405 REPLACING BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT

Special tools required:

• 52 0 050 PLIERS

Necessary preliminary tasks:

- Remove rear panel on front seat, see <u>52 13 198 Removing and installing/replacing rear panel on left</u> or right front seat backrest (normal/manual)
- Remove guide for head restraint, see 52 13 ... Removing and installing / replacing guide for left or right front seat head restraint
- Remove handwheel for lumbar support, see <u>52 13 055 Removing and installing lumbar support on front seat</u>

WARNING: Seat and backrest frames of front seats have very sharp edges. Risk of injury and damage!

WARNING: Observe safety regulations for handling airbag modules and pyrotechnical seat belt tensioners, see <u>72 SAFETY PRECAUTIONS AND</u>

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GENERAL INFORMATION

Improper handling can lead to triggering of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off ignition!

Lever out clips (1).

Detach backrest cover (2) from backrest frame.

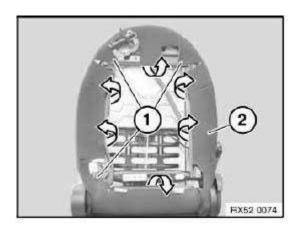
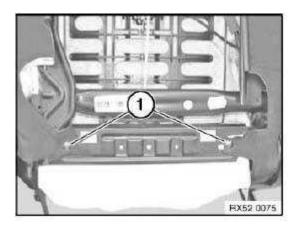


Fig. 38: Detaching Backrest Cover From Backrest Frame Courtesy of BMW OF NORTH AMERICA, INC.

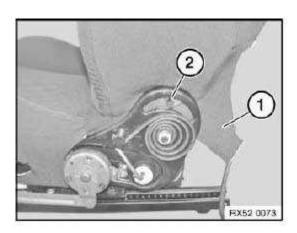
Lever out clips (1).



<u>Fig. 39: Clips</u> Courtesy of BMW OF NORTH AMERICA, INC.

Feed out backrest cover (1) from stud (2) on backrest frame.

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<u>Fig. 40: Backrest Cover With Stud</u> Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable tie (1).

Unlock plug (2) and pull out of plug housing.

Installation:

Replace defective cable tie.

Plugs are coded against incorrect installation.

Feed wiring harness out of holders (3).

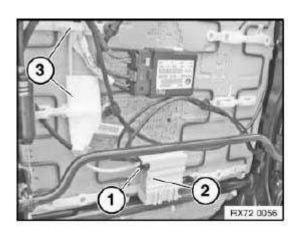


Fig. 41: Unlock Plug And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage seat cover welt from seat frame.

Unclip cable holder (1).

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Feed wiring harness (2) out of seat and backrest frames.

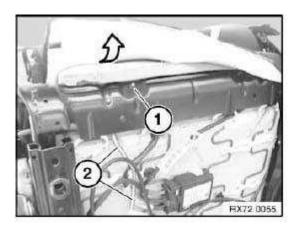
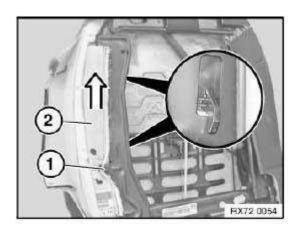


Fig. 42: Disengaging Seat Cover Welt From Seat Frame Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: 72 12 06AZ, see 72 12 AIRBAG GAS GENERATOR, UNIT FOR PASSENGER SIDE .

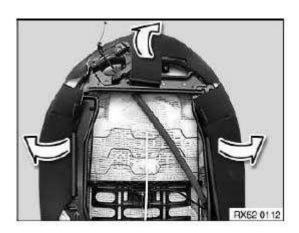
Disengage airbag module in cover pocket (2) from backrest frame.



<u>Fig. 43: Removing Airbag Module In Cover Pocket</u> Courtesy of BMW OF NORTH AMERICA, INC.

Remove backrest cover with padding from backrest frame.

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<u>Fig. 44: Removing Backrest Cover</u> Courtesy of BMW OF NORTH AMERICA, INC.

Pull airbag module downwards out of cover pockets (1).

Installation:

Slide airbag module with suspension hooks up to opening in cover pocket.

Cover pocket (1) must not be damaged.

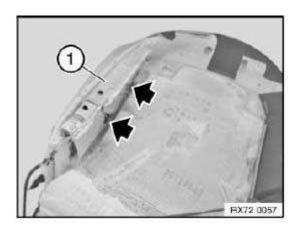


Fig. 45: Locating Cover Pocket
Courtesy of BMW OF NORTH AMERICA, INC.

Release all retainers.

Remove seat cover from padding.

IMPORTANT: Remove all remnants of clips from seat cover and padding.

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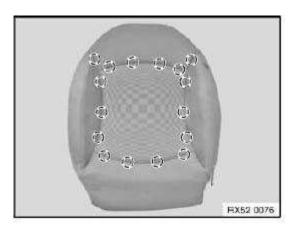
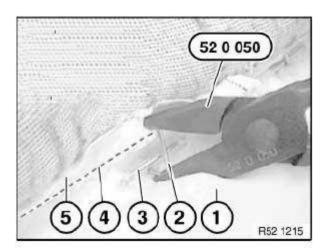


Fig. 46: Remnants Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert new retainer (2) with special tool 52 0 050 and bend closed.

- 1. Padding
- 2. Retainer
- 3. Trim thread in padding
- 4. Trim thread in seat cover
- 5. Seat cover



<u>Fig. 47: Special Tool (52 0 050) On Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

52 13 450 REPLACING HEATING ELEMENT FOR FRONT SEAT (SEAT CUSHION)

Necessary preliminary tasks:

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• Detach seat cover from padding, see <u>52 13 400 Replacing seat cover on left or right front seat (normal/manual)</u>

NOTE: Heating element is partially bonded to foam section and they can be separated from each other without incurring damaged if handled carefully.

Carefully pull off heating element in marked area from foam section.

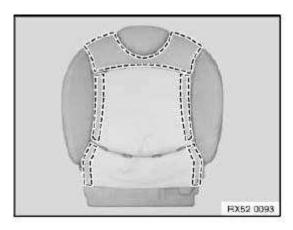


Fig. 48: Heating Element In Marked Area From Foam Section Courtesy of BMW OF NORTH AMERICA, INC.

Check foam section:

- No obvious damage or material defects
- No bubbles in foam section
- No dirt/contamination on foam section or residual foam

Check heating mat:

- No obvious damage or material defects
- o All tear-off film pieces presents
- o Note version by examining label on cable

Installation:

Guide cable for backrest heating through foam hole.

Stick on heating element:

- o Pull off adhesive decals from heating element and stick onto edge of foam part until flush
- Press down evenly in outwards direction

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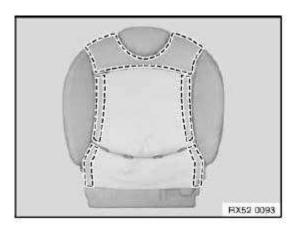


Fig. 49: Heating Element In Marked Area From Foam Section Courtesy of BMW OF NORTH AMERICA, INC.

Check laying of heating element for:

- Heating element laid without folds
- o Heating element correctly positioned
- o All bonding surfaces stuck on

NOTE: Carry out function test.

52 13 451 REPLACING BACKREST HEATING ELEMENT FOR LEFT OR RIGHT SPORTS SEAT

Necessary preliminary tasks:

• Detach backrest cover from padding, see <u>52 13 405 Replacing backrest cover for left or right front seat</u>

NOTE: Heating element is partially bonded to foam section and they can be separated from each other without incurring damaged if handled carefully.

Carefully pull off heating element in marked area from foam section.

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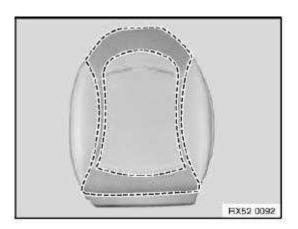


Fig. 50: Heating Element In Marked Area From Foam Section Courtesy of BMW OF NORTH AMERICA, INC.

Check foam section:

- o No obvious damage or material defects
- No bubbles in foam section
- o No dirt/contamination on foam section or residual foam

Check heating mat:

- o No obvious damage or material defects
- o All tear-off film pieces presents
- o Note version by examining label on cable

Installation:

Guide cable for backrest heating through foam hole.

Stick on heating element:

- o Pull off adhesive decals from heating element and stick onto edge of foam part until flush
- o Press down evenly in outwards direction

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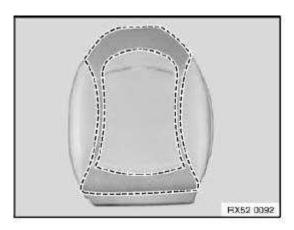


Fig. 51: Heating Element In Marked Area From Foam Section Courtesy of BMW OF NORTH AMERICA, INC.

Check laying of heating element for:

- o Heating element laid without folds
- o Heating element correctly positioned
- o All bonding surfaces stuck on

NOTE: Carry out function test.

26 REAR SEAT, THROUGH-LOADING

52 26 005 REMOVING AND INSTALLING OR REPLACING REAR SEAT

Unclip Isofix covers (1).

Forcefully pull rear seat upwards.

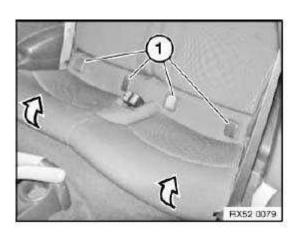
Remove rear seat.

Installation:

Feed in seat belt buckles through opening in rear seat.

Rear seat must be felt to snap into place.

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<u>Fig. 52: Pulling Rear Seat Upwards</u> Courtesy of BMW OF NORTH AMERICA, INC.

52 26 011 REMOVING AND INSTALLING/REPLACING BACKREST FOR LEFT REAR SEAT

Unlock backrests and fold down.

Press retaining tab in center of car and lift left backrest out of central hinge.

Installation:

Backrest must audibly snap into place in central hinge.

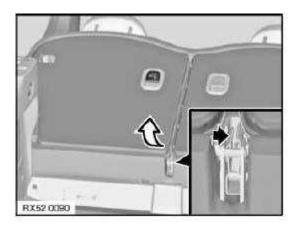


Fig. 53: Pressing Retaining Tab
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Turn backrest and remove bearing bushing (1).

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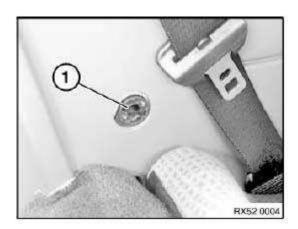


Fig. 54: Bearing Bushing Courtesy of BMW OF NORTH AMERICA, INC.

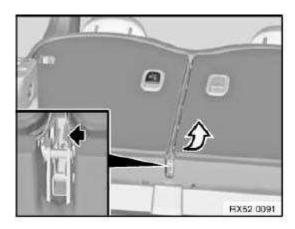
52 26 012 REMOVING AND INSTALLING/REPLACING BACKREST FOR RIGHT REAR SEAT

Unlock backrests and fold down.

Press retaining tab in center of car and lift right backrest out of central hinge.

Installation:

Backrest must audibly snap into place in central hinge.



<u>Fig. 55: Locating Retaining Tab</u> Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Turn backrest and remove bearing bushing (1).

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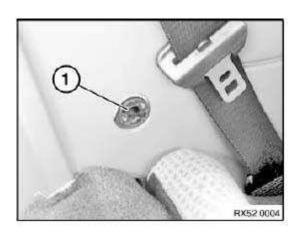


Fig. 56: Bearing Bushing Courtesy of BMW OF NORTH AMERICA, INC.

52 26 086 REMOVING AND INSTALLING/REPLACING BACKREST FRAME FOR LEFT OR RIGHT REAR SEAT

Operation is described in:

- Removing lock for rear seat backrest, see <u>52 26 311 Removing and installing/replacing lock for left or right rear seat backrest</u>
- Removing rear panel on rear seat backrest, see <u>52 26 201 Removing and installing/replacing rear panel</u> <u>on rear seat backrest</u>

52 26 201 REMOVING AND INSTALLING/REPLACING REAR PANEL ON REAR SEAT BACKREST

Necessary preliminary tasks:

• Remove backrest cover for rear seat, see <u>52 26 413 Removing and installing/replacing backrest cover for left or right rear seat</u>

Unclip trim (1) and feed out from lever (2).

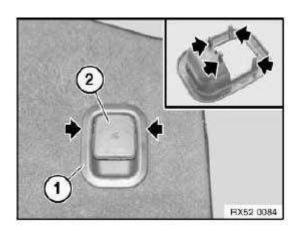
Installation:

Retaining lugs must not be damaged.

If necessary, replace faulty trim (1).

Remove rear panel from backrest frame.

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<u>Fig. 57: Rear Panel From Backrest Frame</u> Courtesy of BMW OF NORTH AMERICA, INC.

52 26 303 REMOVING AND INSTALLING/REPLACING ACTUATOR FOR REAR SEAT BACKREST

Necessary preliminary tasks:

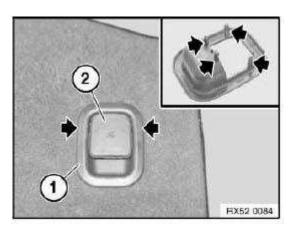
• Remove backrest cover, see <u>52 26 201 Removing and installing/replacing rear panel on rear seat backrest</u>

Unclip trim (1) and feed out from release lever (2).

Installation:

Retaining lugs must not be damaged.

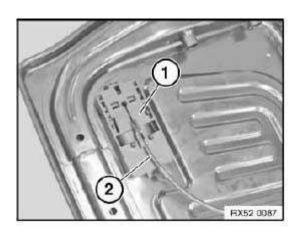
If necessary, replace faulty trim (1).



<u>Fig. 58: Rear Panel From Backrest Frame</u> Courtesy of BMW OF NORTH AMERICA, INC.

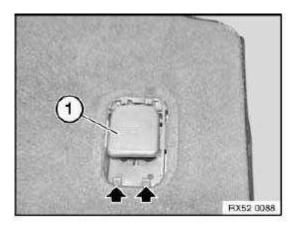
Feed Bowden cable (2) out of grip recess plate (1).

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<u>Fig. 59: Bowden Cable And Plate</u> Courtesy of BMW OF NORTH AMERICA, INC.

Press in detent lugs and remove grip recess plate (1).



<u>Fig. 60: Grip Recess Plate</u> Courtesy of BMW OF NORTH AMERICA, INC.

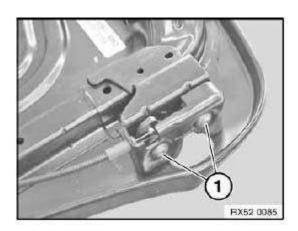
52 26 311 REMOVING AND INSTALLING/REPLACING LOCK FOR LEFT OR RIGHT REAR SEAT BACKREST

Necessary preliminary tasks:

• Remove backrest cover, see <u>52 26 201 Removing and installing/replacing rear panel on rear seat</u> backrest

Release screws (1).

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<u>Fig. 61: Right Rear Seat Backrest Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unclip Bowden cable (1) and feed out from rear seat backrest lock.

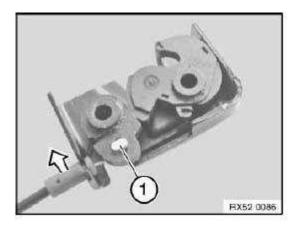


Fig. 62: Bowden Cable Courtesy of BMW OF NORTH AMERICA, INC.

52 26 390 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT REAR HEAD RESTRAINT

Press release (1) and pull out head restraint.

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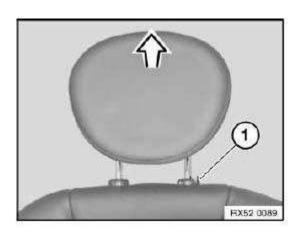


Fig. 63: Pulling Out Head Restraint Courtesy of BMW OF NORTH AMERICA, INC.

52 26 400 REPLACING SEAT COVER FOR REAR SEAT

Special tools required:

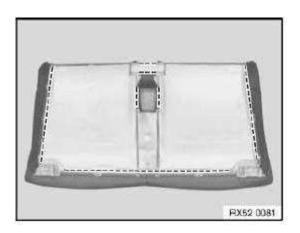
• <u>52 0 050 PLIERS</u>

Necessary preliminary tasks:

• Remove rear seat, see 52 26 005 Removing and installing or replacing rear seat

Disengage welt in marked area from seat frame.

Remove seat cover with padding from seat frame.



<u>Fig. 64: Seat Cover Marked Area</u> Courtesy of BMW OF NORTH AMERICA, INC.

Detaching cover and padding:

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- Disconnect all retainers in marked area
- Remove seat cover from padding
- Remove all remnants of retainers from cover and padding

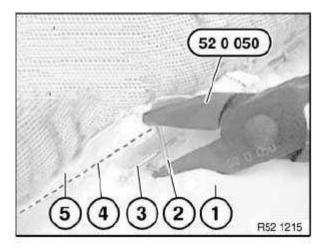


<u>Fig. 65: Retainers</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert new retainer (2) with special tool 52 0 050 and bend closed.

- 1. Padding
- 2. Retainer
- 3. Trim thread in padding
- 4. Trim thread in seat cover
- 5. Seat cover



<u>Fig. 66: Special Tool (52 0 050) On Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

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52 26 413 REMOVING AND INSTALLING/REPLACING BACKREST COVER FOR LEFT OR RIGHT REAR SEAT

Special tools required:

• 52 0 050 PLIERS

Necessary preliminary tasks:

• Remove left or right rear seat backrest, see <u>52 26 011 Removing and installing/replacing backrest for</u> left rear seat

WARNING: Backrest frames of rear seats have very sharp edges. Risk of injury and damage!

IMPORTANT: Do not damage backrest cover.

Press backrest cover with padding next to guide downwards to expose detent lugs.

Unlock detent lugs and lift out guide.

Installation:

Replace faulty guides.

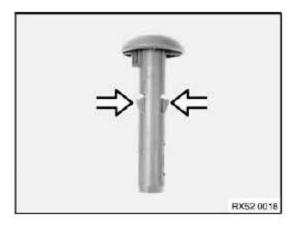


Fig. 67: Pressing Detent Lugs Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove cover from central hinge.

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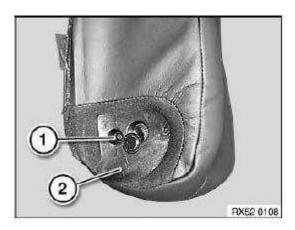
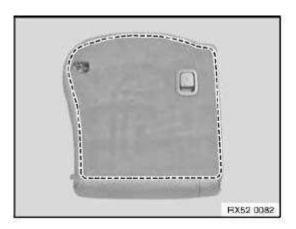


Fig. 68: Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out welt from backrest cover all round with screwdriver.

Remove backrest cover with padding from backrest frame.



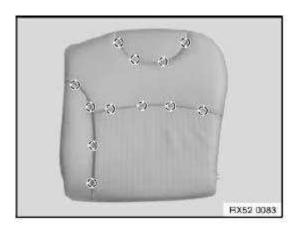
<u>Fig. 69: Seat Cover Mark Area</u> Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

Detaching cover from padding:

- Disconnect all retainers in marked area
- Remove cover from padding
- Remove all remnants of retainers from cover and padding

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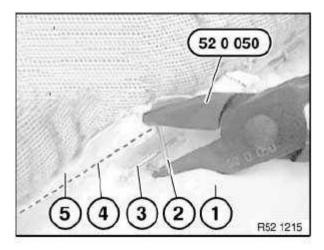


<u>Fig. 70: Retainers In Marked Area</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert new retainer (2) with special tool 52 0 050 and bend closed.

- 1. Padding
- 2. Retainer
- 3. Trim thread in padding
- 4. Trim thread in seat cover
- 5. Seat cover



<u>Fig. 71: Special Tool (52 0 050) On Retainer</u> Courtesy of BMW OF NORTH AMERICA, INC.

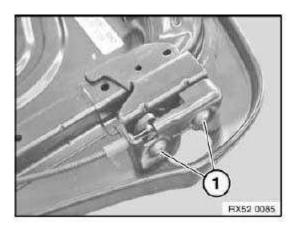
52 26 751 REPLACING BOWDEN CABLE FOR LEFT OR RIGHT REAR SEAT BACKREST

Necessary preliminary tasks:

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• Remove backrest cover, see <u>52 26 201 Removing and installing/replacing rear panel on rear seat</u> backrest

Release screws (1).



<u>Fig. 72: Right Rear Seat Backrest Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Unclip Bowden cable (1) and feed out from rear seat backrest lock.

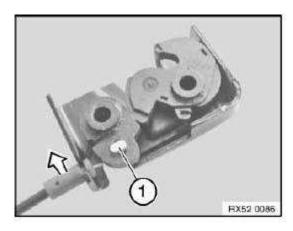


Fig. 73: Bowden Cable Courtesy of BMW OF NORTH AMERICA, INC.

Feed Bowden cable (2) out of grip recess plate (1).

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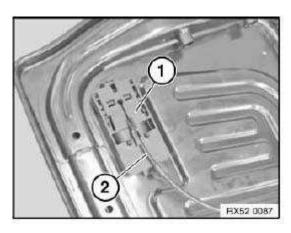


Fig. 74: Bowden Cable And Plate Courtesy of BMW OF NORTH AMERICA, INC.

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MINI STEERING AND SUSPENSION

BASIC SUSPENSION GEOMETRY

Caster

Caster is the forward or rearward tilt of the steering axis centerline, as viewed from the side of the vehicle, and is measured in degrees from a vertical. It is a directional control geometry angle that helps keep the vehicle moving straight ahead.

If the steering axis is tilted rearward, it is called "Positive Caster". A forward tilt is called "Negative Caster".

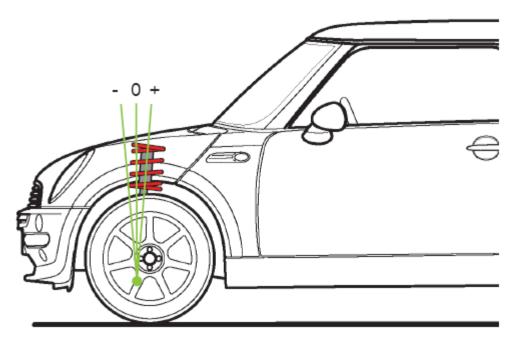


Fig. 1: Caster Angle Courtesy of BMW OF NORTH AMERICA, INC.

On MINI vehicles, Caster is always positive. Positive Caster increases stability at high speeds. Positive Caster also causes increased steering effort at low speeds. Systems such as Servotronic help minimize this negative effect. In addition to increased high speed stability, cornering is enhanced and steering wheel returnability is improved by positive Caster.

Caster is measured in degrees. On MINI vehicles, Caster is a non-adjustable angle. But Caster is influenced by damaged suspension components. When performing a wheel alignment, always check Caster to insure there is no hidden damage.

Cross Caster

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Cross Caster is the difference in the Caster measurement from left to right. Excessive Cross Caster can cause the vehicle to pull to the side with the least positive caster.

Camber

Camber is the inward or outward tilt of the wheels when viewed from the front of the vehicle. The amount of tilt is measured in degrees from the vertical and is called the camber angle.

If the wheel tilts out at the top, the camber angle is positive and if the wheel tilts in at the top it is negative.

Excessive Positive Camber will cause abnormal wear on the outer edge of the tire.

Excessive Negative Camber will cause abnormal wear on the inner edge of the tire.

Camber is measured in Degrees and Minutes and is measured at the front and rear of the vehicle. Camber is adjustable on some MINI models.

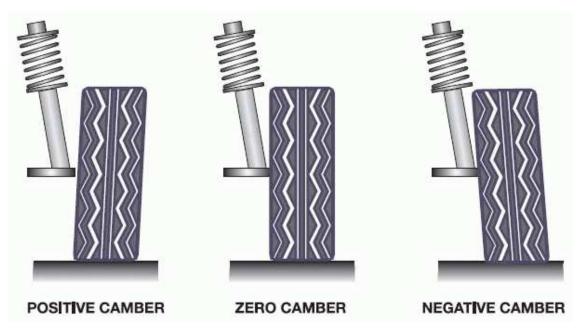


Fig. 2: Camber Angle Courtesy of BMW OF NORTH AMERICA, INC.

Cross Camber

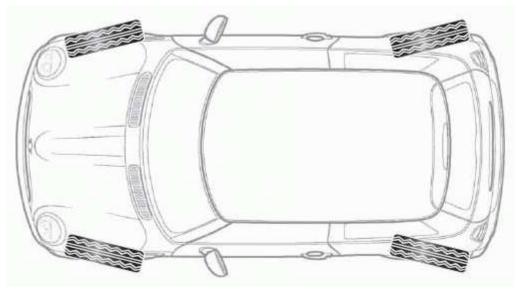
Cross Camber is the difference between camber angles from left to right. If Cross Camber is excessive, the vehicle will pull to the side with the **most** positive Camber.

Toe In/Toe Out

Toe is the difference in length by which the wheels of each axle differ from each other, front to rear, in the straight ahead position. The rear wheels are also subject to toe measurement.

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Toe is measured at the center of the wheels from one wheel rim to the other. When the distance is greater at the rear of the wheels, it is called toe-in.



<u>Fig. 3: Toe In Angle</u> Courtesy of BMW OF NORTH AMERICA, INC.

When the distance is greater at the front of the wheels, it is called toe-out.

Front wheel drive vehicles generally will have a small amount of toe-out at the front wheels. This will allow the wheels to toe-in when rolling to achieve a zero running toe.

Toe is measured in degrees when using MINI specifications. Front toe is adjustable on all MINI vehicles. Rear toe is only adjustable on some models.

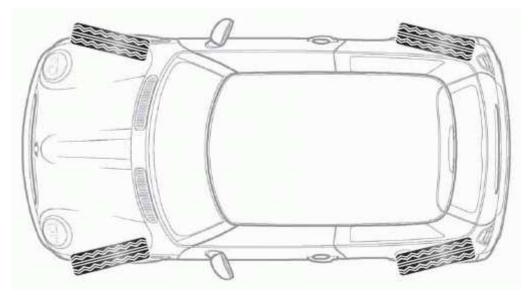


Fig. 4: Toe Out Angle Courtesy of BMW OF NORTH AMERICA, INC.

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Steering Roll Radius (Steering Offset)

The steering offset is the distance between the point of contact of the projected line drawn through the steering axis to the road surface and the center point of the tire contact area (foot print). The roll radius is the distance between these two lines

- A positive roll radius exists when the steering axis line is inside the center line of the tire.
- A negative roll radius exists when the steering axis line is outside of the tire center line.

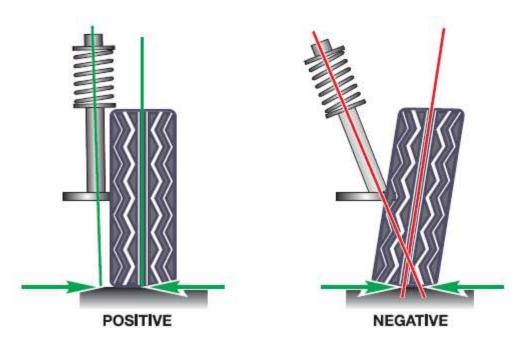


Fig. 5: Steering Roll Radius (Steering Offset)
Courtesy of BMW OF NORTH AMERICA, INC.

When the Steering Roll Radius is excessively positive, stability during braking is reduced. When the Steering Roll Radius is excessively negative, the directional stability is reduced and there is reduced feedback to the driver through the steering wheel. MINI vehicles are designed with a slightly positive Steering Roll Radius. This gives the driver a better "road feel" without compromising braking stability.

Steering Roll Radius is not adjustable, but can be influenced by improper tire and wheel combinations. Wheels with incorrect offsets can compromise handling characteristics.

Scrub Radius is another term used to describe Steering Roll Radius.

Steering Axis Inclination (SAI)

Steering Axis Inclination is the inward tilt (angle) of the strut assembly with respect to a vertical line to the road surface.

SAI results in self-correcting forces that cause the front wheels and steering wheel to return to a straight ahead position after cornering.

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SAI is not adjustable, but is affected by damaged suspension components. Most current alignment equipment can measure SAI and can aid in the diagnosis of damaged parts. Bent strut or spindle assemblies are common causes of incorrect SAI readings.

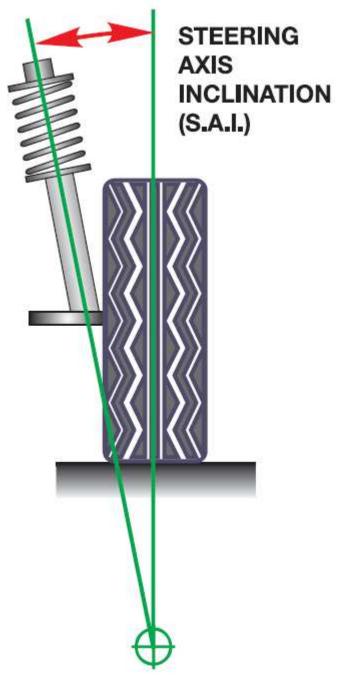


Fig. 6: Steering Axis Inclination (SAI)
Courtesy of BMW OF NORTH AMERICA, INC.

Included Angle (IA)

Included angle is the Camber angle and SAI combined. IA is also helpful when trying to diagnose bent

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suspension components. Knowing the IA and SAI is helpful when adjusting Camber. If the desired Camber angle cannot be achieved, then looking at SAI and IA could help determine the cause.

Toe Out on Turns

Also referred to as "Turning Angle", Toe out on turns results from the different angles (arcs) taken by the front wheels when driving through a corner. When turning a corner, the outside wheel must travel a greater distance than the inside wheel. The additional toe angle is determined by the steering arm design. Deviations from the specified value could indicate possible bent steering linkage. A typical complaint that would be associated with this condition would be excessive tire squeal or "scrubbing" on turns. When looking for this specification in TIS, look for the "Track Differential Angle" specification.

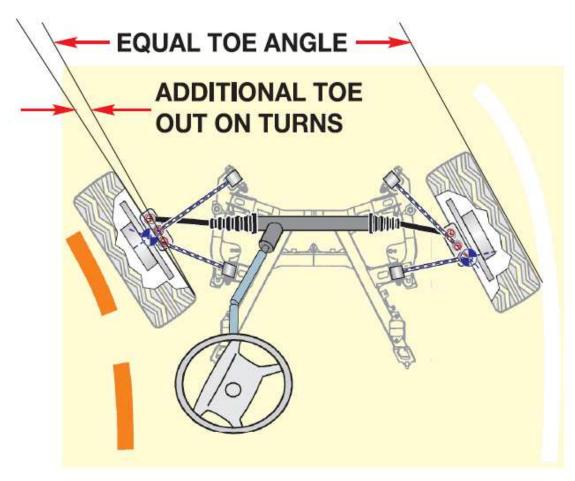


Fig. 7: Toe Out On Turns
Courtesy of BMW OF NORTH AMERICA, INC.

Geometric Axis

The Geometric Axis (Centerline) is an imaginary line that is drawn between the midpoints of both front and rear wheels. The Axis is perpendicular to front and rear axles at 90 degrees This is an imaginary angle that is not adjustable.

Thrust Line/Thrust Angle

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The Thrust Line is represented by an imaginary line that bisects the rear toe angle. This angle represents the overall "direction" in which the rear wheels are pointing. The Thrust Angle is the difference between the Geometric Axis and the Thrust Line. The optimum Thrust Angle is Zero Degrees, any deviation from this will affect the position of the steering wheel.

Positive Thrust Angle

Positive Thrust Angle is formed when the Thrust Line is to the right of the Geometric Axis (Centerline). When this situation occurs, the steering wheel position will be off to the right as well. The rear of the vehicle will tend to move to the right which will cause the front of the vehicle to steer left, the driver will move the steering wheel to the right to compensate.

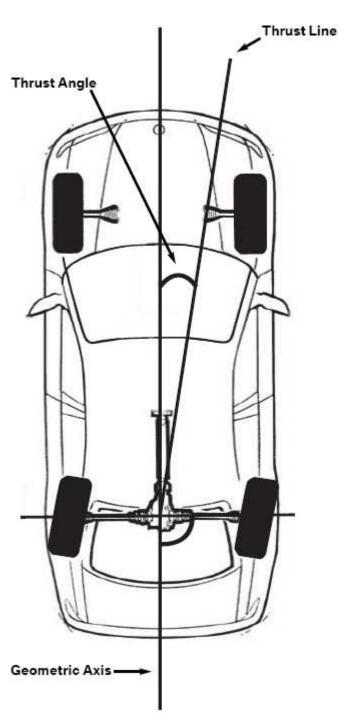
Negative Thrust Angle

Negative Thrust Angle is formed when the Thrust Line is to the left of the Geometric Axis (Centerline). When this situation occurs, the steering wheel position will be off to the left as well. The rear of the vehicle will tend to move to the left which will cause the front of the vehicle to steer right, the driver will move the steering wheel to the left to compensate.

Alignment Procedures

When performing a wheel alignment, make sure that the thrust angle is as close to zero as possible. Failure to do so can result in a steering wheel that is not centered.

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<u>Fig. 8: Geometric Axis</u> Courtesy of BMW OF NORTH AMERICA, INC.

Elasto-Kinematics

Elasto-kinematics relates to the suspension system design type. The term "elasto" implies stretching, which in fact the system does. Under extreme load (acceleration, turning, braking) the suspension changes its geometry to counteract inherent changes induced by the increased loads.

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The system changes are pre-determined and built into the system. The geometry changes provided by this system correct for unwanted changes that occur under load in non-elasto-kinematic systems.

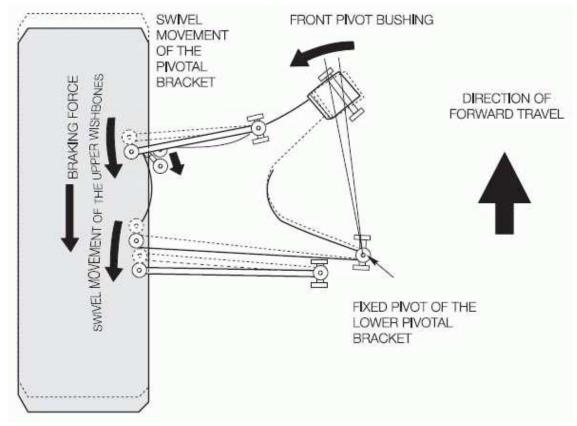


Fig. 9: Elasto-Kinematics
Courtesy of BMW OF NORTH AMERICA, INC.

SUSPENSION SYSTEM

The suspension system used on MINI provides a firm and responsive ride with superb levels of comfort and good acoustic properties. The weight distribution between the front and rear axles is biased to the front due the front wheel drive configuration.

Adjustment to the camber at the front and rear suspension is not possible, only the front and rear toe is adjustable.

Power assisted steering using an electric pump and ABS is standard, with DSC available as an option on MINI COOPER. ASC is standard on the COOPER S, DSC is optional.

Front Suspension

The front suspension design features anti-dive and anti-squat geometry via the anti-roll bar and 1:1 strut movement ratio. The layout of the design minimizes camber loss due to side forces, thus improving handling and steering response.

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MINI Front Suspension

Fig. 10: Front Suspension
Courtesy of BMW OF NORTH AMERICA, INC.

Advantages of MINI Front Suspension

- Firm and Responsive
- Positive Driver Feedback through Steering
- Strict Camber Control

The front suspension consists of the following main components:

- Front Subframe
- Lower Control Arms
- Anti-Roll Bar and Links
- McPherson Struts
- Front Shocks
- Front Springs
- Front Top Mount
- Front Hubs

System Components

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- 1. Front Mounting Points
- 2. Rear Mounting Points
- 3. Attachment Point for Crush Tubes

Front Subframe

Fig. 11: Front Subframe Courtesy of BMW OF NORTH AMERICA, INC.

Front Subframe

A main component of the front suspension is the Subframe. It is made from hydroformed steel tubing and bolts directly to the body. The subframe provides the location for all suspension and steering components with the exception of the upper strut mounts. Attached between the front of the subframe and the bumper are the crush tubes. These tubes are attached with two bolts to the subframe and are designed to deform in an accident.



- 1. Attachment Point to Front Subframe
- 2. Attachment Point to Front Bumper Armature

Crush Tubes

Fig. 12: Crush Tubes
Courtesy of BMW OF NORTH AMERICA, INC.

Lower Control Arms

The pressed steel lower control arm links the subframe to the hub assembly via two ball joints. The inner joint is bolted to the subframe and the outer joint to the hub assembly.

The rear of the lower control arm has a hexagonal shaft onto which the compliance bushing is press fit. The compliance bushing is attached to the body with a single mounting and to the subframe with two bolts, which also secure the anti-roll bar.

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- Lower control Arm
- 2. Rear Bushing Shaft
- 3. Lower Arm Compliance Bushing and Housing
- 4. Ball Joint (Lower Control Arm to Subframe)
- 5. Ball Joint (Lower Control Arm to Hub)

Lower Control Arm Assembly

Fig. 13: Lower Control Arm Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

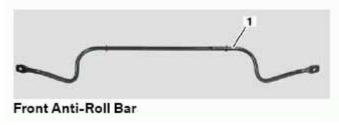
As the suspension moves, the lower control arm pivots on the inner ball joint. The linear movement of the suspension is changed to rotational movement of the lower control arm, which is controlled by the radial stiffness of the compliance bushing.

Should replacement be necessary a new bushing and housing assembly will be required. Both ball joints are available as separate service parts.

Anti-Roll Bar and Links

Two sizes of anti-roll bar are used at the front axle:

- 19 mm for MINI COOPER
- 24 mm for the COOPER S.



<u>Fig. 14: Front Anti-Roll Bar</u> Courtesy of BMW OF NORTH AMERICA, INC.

The anti-roll bar bushings clamped to the top of the compliance bushing housings are manufactured from low friction PTFE (silicon impregnated rubber). This material requires no additional lubrication. This allows the anti-roll bar to rotate freely and quietly. It also allows the anti-roll bar to respond quickly to roll inputs and the use of stiffer bushings, as there is no compression or twisting as found on conventional bushings. Washers attached to the anti-roll bar located on the inside of each bushing prevent sideways movement.

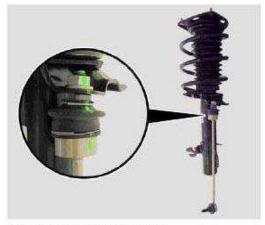
The anti-roll bar links have ball joints fitted at each end. The ball joint attached to the strut is mounted on the same axis as the link. The ball joint attached to the anti-roll bar is mounted at 90° to the axis of the link and is

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attached to the front of the anti-roll bar with the nut facing rearward.

Workshop Hint

The stabilizer links are either attached to the spring seat (where the lower portion of the spring rests), or to the side of the strut depending on production dates.



The ends of the anti-roll bar are attached to the struts by a link. This allows the anti-roll bar to act on a 1:1 ratio to road wheel travel providing maximum effectiveness.

Anti-Roll Bar Link Ball Joint

Fig. 15: Anti-Roll Bar Link Ball Joint
Courtesy of BMW OF NORTH AMERICA, INC.

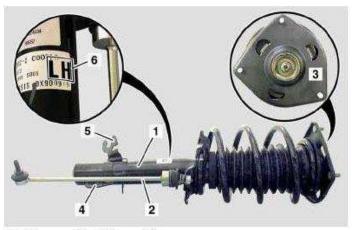
Modified McPherson Struts

Two twin tube construction Modified MacPherson struts control the damping of the front suspension. Each strut assembly consists of a damper unit, a coil spring and a top mount assembly. The coil spring is retained in a compressed condition between the strut spring seat and the top mount. Isolators at each end of the spring reduce noise transmission from the suspension to the cabin.

A bearing is fitted to the top spring mount that allows the spring to rotate as the steering is operated. The coil spring axis is offset to the axis of the damper. This arrangement reduces friction between the damper and piston during cornering. A dust cover protects the piston rod from dirt ingress.

No provision is made for camber adjustment at the top mounting.

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McPherson Strut Assembly

- 1. Damper
- 2. Anti-Roll Bar Link
- 3. Top Mount
- 4. Damper Location Bracket to Hub
- 5. Brake Hose and ABS Sensor Bracket
- 6. Label Left or Right Designation

Fig. 16: McPherson Strut Assembly Courtesy of BMW OF NORTH AMERICA, INC.

Front Shocks

The front shocks are designed as twin-tube gas pressure shocks, similar to the E46. The lower end of the damper is inserted into a cylindrical sleeve on the swivel hub. The damper bracket determines the correct orientation of the damper; the bracket slides into a machined slot in the swivel hub cylindrical sleeve and is secured with a pinch bolt. A label is adhered to the damper for side identification.

The top mounts attach to the body with three studs and are replaced as a complete assembly. There is no provision for adjustment of the camber at the front top mounts.

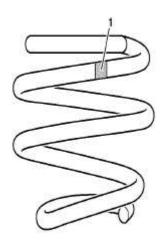


Front Swivel Hub

- 1. Machined Slot for Damper Bracket
- 2. Pinch Bolt Hole

Fig. 17: Front Swivel Hub Courtesy of BMW OF NORTH AMERICA, INC.

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Front Spring

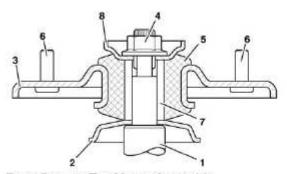
Fig. 18: Front Spring Courtesy of BMW OF NORTH AMERICA, INC.

Front Springs

The spring mounts between the seat on the damper body and the top mount, and is color coded to suit the suspension type and equipment level of the car.

Top Mount

The top mount assembly includes the top mounting plate, with a bonded rubber bushing and integral metal sleeve; three studs are pressed into the plate to retain the assembly to the body. The steel insert in the bushing prevents the damper rod retaining nut from over compressing the bushing when it is tightened. The bushing is not serviceable and a new top mount plate assembly must be fitted if replacement is required. Three lugs on the underside of the top mount plate provide location for the top mount bearing. The bearing is available as a service part separate from the top mount plate.



Front Damper Top Mount Assembly

- 1. Damper rod
- 2. Bump Plate
- 3. Top Mount Plate
- 4. Retaining Nut
- 5. Elastomer rubber
- 6. Stud (Top Mount to Body)
- 7. Bushing inner (Steel Inserts)
- 8. Rebound Plate

Fig. 19: Front Damper Top Mount Assembly Courtesy of BMW OF NORTH AMERICA, INC.

GENERAL SUSPENSION DATA

Data	MINI COOPER / MINI COOPER S

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Ride height front (1)	$660 \text{ mm} \pm 10 \text{ mm} (15") 673 \text{ mm} (16") 686 \text{ mm} (17")$		
Ride height rear (2)	543 mm ± 10 mm (15") 556 mm (16") 571 mm (17")		
Toe front left	0° 00' ±7.5'		
Toe front right	0° 00' ±7.5'		
Total toe front	0° 00' ±15'		
Toe rear left	0° 12' ±0° 04'		
Toe rear right	0° 12' ±0° 04'		
Total toe rear	0° 24' ±0° 08'		
Camber front left	-0° 54' ±0° 30'		
Camber front right	-0° 54' ±0° 30'		
Maximum variation	1°		
Camber rear left	-1° 32' ±0° 30'		
Camber rear right	-1° 32' ±0° 30'		
Maximum variation	0° 30'		
Castor left	+4° 58' ±30'		
Castor right	+4° 58' ±30'		
KPI left	+11° 32' ±30'		
KPI right	+11° 32' ±30'		
Setback (Thrust angle)	0° 00' ±0° 10'		
Wheel Base	2467		
Front track	1462 mm / 1456 mm (COOPER S)		
Rear track	1465.6 mm / 1460 mm (COOPER S)		
	(1456 mm with 205/45 R17 tires on COOPER S)		
Ride height is measured between	en bottom of rim flange and special tool.		
D:1 1 : 1 :	1 ,, C: C , 1 1 1 C 1 1 1		

⁽²⁾ Ride height is measured between bottom of rim flange to lower edge of wheel arch.

Suspension Loading Information for Alignment

SUSPENSION LOADING INFORMATION FOR ALIGNMENT

Driver Seat	Passenger Seat	Rear Seat	Trunk
68 kg	68 kg	0kg	14kg

Rear Suspension

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MINI Rear Suspension

Fig. 20: Rear Suspension Courtesy of BMW OF NORTH AMERICA, INC.

The multi-link rear suspension is used for all models of MINI, making it the only car in its class to use such a sophisticated system. Benefits of this suspension are the exceptional handling characteristics and ride comfort, with good acoustic properties.

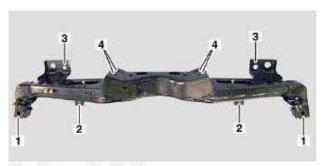
Main components of the rear suspension include:

- Rear Subframe
- Trailing Arms
- Lateral Links
- Anti-Roll Bar
- Rear Springs
- Rear Shocks

System Components

The fabricated subframe is attached to the body by four bolts. The inside bolt (3 on illustration) on the left side of the subframe is the master bolt to ensure the subframe is in its correct lateral position. The subframe also provides attachment points for the fuel tank straps and rear suspension lateral links. The anti-roll bar attachment points are on the top of the subframe and cannot be seen on the illustration.

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- 1. Subframe to Body Mounting Points 2. Fuel Tank Strap Mounting Locations
- 3. Master Mounting Bolt Location
- 4. Rear Suspension Lateral Link Mountings

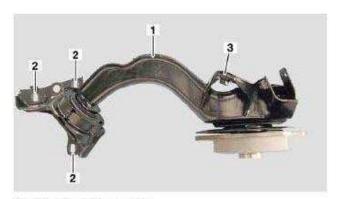
Rear Suspension Subframe

Fig. 21: Rear Suspension Subframe Courtesy of BMW OF NORTH AMERICA, INC.

Trailing Arms

The trailing arms are fabricated from steel with a wall thickness of approximately 4 mm. The trailing arm provides toe-in control; counters brake lift and provides a low roll center. The arm also provides attachment for the brake caliper, damper unit and anti-roll bar. The trailing arms have two attachment points for the upper and lower lateral links to aid in the track control.

Attached to the front of the arm is the compliance bushing and housing. The housing is attached to the trailing arm by a single bolt. This controls side-force steer performance and enhances ride and noise levels. The bushing is located in a fabricated bracket held to the body by three bolts. The bolt holes in the bracket are slotted to allow for toe-in adjustment. Correct orientation of the bracket to the trailing arm is important to ensure correct wind up when fitted to the body.



- 1. Z Axle Trailing Arm
- 2. Mounting Bolts (also rear toe adjustment)
- 3. Damper Lower Mounting

Trailing Arm Assembly

Fig. 22: Trailing Arm Assembly Courtesy of BMW OF NORTH AMERICA, INC.

Lateral Links

The lateral links control the track of the rear wheels and are made of fabricated steel with elasto-kinematic bushings at both ends. The bolts locating the lateral links to the subframe and trailing arm should only be torque tightened with the car in curb side condition (full weight of the car on the suspension).

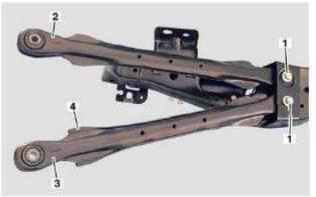
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The lateral links are not side specific. The two lower lateral links have protective covers fitted (forward facing) to protect them from becoming damaged by impact.

1. Inner Mounting Bolts to Frame

Lateral Link Protective Cover

Upper Lateral Link
 Lower Lateral Link



- Lateral Links to Subframe
- Fig. 23: Lateral Links To Subframe
 Courtesy of BMW OF NORTH AMERICA, INC.

Rear Anti-Roll Bar and Links

Two sizes of anti-roll bar are used at the rear axle:

- 16 mm for MINI COOPER
- 17 mm for the COOPER S.

The anti-roll bar is attached to the top of the rear subframe by two PTFE bushings secured with clamp plates. The low friction PTFE bushings allow the anti-roll bar to rotate freely and quietly and require no additional lubrication. The anti-roll bar is made of solid spring steel. The anti-roll bar links from the anti-roll bar to trailing arm have ball joints at both ends and can be installed only one way, with the ball joints on the inside.



- Rear Anti-Roll Bar
- <u>Fig. 24: Rear Anti-Roll Bar</u> Courtesy of BMW OF NORTH AMERICA, INC.

- 1. Rear Anti-Roll Bar
- 2. Anti-Roll Bar Bushing and Clamp to Subframe

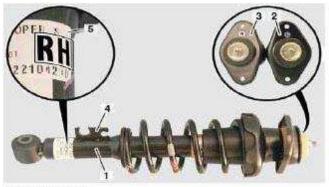
Rear Springs

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Coil springs, manufactured from silicon steel, are fitted to the shock assembly. The springs are retained at the lower end by plates attached to the shock. Between the spring and shock is an isolator. The top of the spring is contained with an isolator and cup that is clamped between the shock rod and rebound plate by a nut.

Rear Shocks and Top Mounts

The shocks at the rear are of the twin-tube gas pressure design, and like the front axle, the rear shocks are side specific. The shock rod is located in a bushing in the top mounting and is secured with a rebound plate and a locknut. The top mounts are side specific and identified by the letter "R" or "L" and attached to the body by two bolts



- 1. Damper
- 2. Top Mount (Left)
- 3. Top Mount (Right)
- 4. Brake Hose and ABS Sensor Bracket
- 5. Label Left/Right Damper Designation

Rear Damper

Fig. 25: Rear Damper Courtesy of BMW OF NORTH AMERICA, INC.

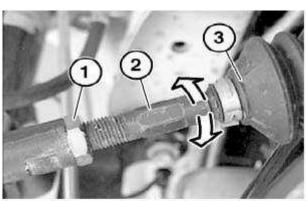
Adjustments

Front and rear Toe are adjustable on all variants. Caster and Camber are NOT adjustable, but should always be checked during the wheel alignment to insure there is no damage. If the proper Toe, Caster and Camber measurements cannot be obtained, check for suspension damage.

Front Suspension Adjustments

The front toe angle is adjusted via the tie rods. Loosen the lock nut and turn inner tie rod until required measurement is obtained.

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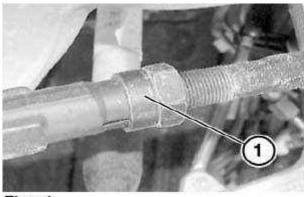


Tie Rod

- 1. Locking nut
- 2. Inner tie rod
- 3. Rubber boot

Fig. 26: Tie Rod (1 Of 2)

Courtesy of BMW OF NORTH AMERICA, INC.



Tie rod

1. Collar

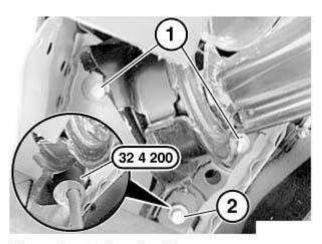
Fig. 27: Tie Rod (2 Of 2)

Courtesy of BMW OF NORTH AMERICA, INC.

Rear Suspension Adjustments

The rear to eangle is adjusted by moving the forward central arm bushing mount with special tool # 324 200, once the three mounting bolts are loosened. The central arm has slotted holes which allow for movement.

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Foward central arm bushing

- 1. Mounting bolts
- 2. Eccentric tool adjustment point

Fig. 28: Forward Central Arm Bushing Courtesy of BMW OF NORTH AMERICA, INC.



Special tool #324 200

Fig. 29: Special Tool #324 200 Courtesy of BMW OF NORTH AMERICA, INC.

Alignment Procedures

The following procedure is an outline to follow based on TIS. The actual alignment procedures will vary depending upon the alignment equipment being used. Refer to the alignment equipment manufacturers procedures for specific information. The steps listed below should be followed as closely as possible to perform a quality alignment.

• Vehicle Inspection - The vehicle inspection should include a road test before and after the alignment. Note any concerns during the pre-alignment road test and verify that the concern has been rectified during the post-alignment road test.

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- Install Specified Weight 2 x 68 kg on front seats (seats in central position), 1 x 14 kg in luggage compartment (center) and full fuel tank.
- Install Alignment Sensors Install alignment sensors as per the alignment equipment manufacturers recommended procedures.
- Compensate Sensors Depending upon the alignment sensors being used, compensation may not be necessary. Compensation may require the vehicle to be lifted from the alignment rack. If so, be sure to remove the pins from the front and rear slip plates. If the sensors do not need to be compensated, the next step can be ignored.
- Lower Vehicle and Jounce Make sure the pins are removed from the slip plates. Lower the vehicle back onto the alignment rack and jounce the vehicle. This will insure that the suspension has settled.
- Check Ride Height Check ride height using metric tape measure. Ride height specifications can be found in Technical Data in TIS. Front ride height specs can be found under group 31 and rear can be found under group 33. Always check ride height after compensating the sensors. This will avoid having to check the ride height twice.
- Perform Alignment There and various types of alignment equipment used in MINI workshops. Refer to the equipment manufacturers instructions for the next steps of the alignment.

Vehicle Inspection

Before attempting to align any vehicle, it is important to inspect the vehicle completely to insure there are no damaged or loose suspension components. Regardless of the age or mileage of the vehicle, a complete inspection should be performed. The following items should be checked thoroughly:

- Tires and Wheels Check tires for wear patterns that could indicate suspension problems. Make sure the tires are the correct size and type. Check for the correct inflation pressures. Look for wheel/rim damage which could indicate impact damage.
- Wheel bearings Check to make sure there is no excessive wheel bearing play. This needs to be addressed for safety reasons, but loose wheel bearings will affect the quality of the alignment as well.
- Steering Linkage- Check the tie rods. On vehicles with rack and pinion steering, check for loose inner/outer tie rods etc.

Check flexible coupling between steering shaft and rack and pinion assembly.

- Suspension Components Check Struts/Shocks for leakage or damage. Check springs and perform ride height measurements.
- Subframe Check the front and rear axle carriers. Look for bent/twisted subframes. Check the crossmembers for evidence of shifting or displacement. Check the mounting bolts for "clean spots" which could indicate shifting or movement.
- Brakes Check braking system by road testing the vehicle. A road test could help to identify brake related issues such as pulling or brake induced vibrations.
- Drivetrain While road testing the vehicle, observe and vibrations and/or noises and try to isolate the cause. Noises and vibrations under acceleration (rather than coasting) may be an indication of drivetrain issues.

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Whenever possible, a vehicle should be road tested before and after an alignment. If time allows, drive on various road surfaces and note the vehicle behavior. Check for brake pull when stopping. And most importantly, note the position of the steering wheel before and after the alignment. These are important steps to avoid comebacks and unnecessary return visits.

Ride Height Measurement

When performing alignments on MINI vehicles, the ride height must be set and checked before proceeding with any measurement or adjustments. Ride height is measured from the lower edge of the wheel rim to special tool #324 110. Ride height specifications are in millimeters. The specifications can be found in Technical Data. The front axle ride height is in Group 31 and the rear axle ride height is in Group 33. In order to obtain the correct specification and suspension type must be identified.

Ride height specifications depend upon rim size (15", 16", 17" etc.), engine size and the type of suspension. There are 4 different types of suspension packages:

- Series Standard production vehicle
- Sports Suspension Used on the R50 with Sports Package Option.
- Sports Suspension Plus Used on the R50 and R53 with Sports Package Option
- Sports Suspension, JOHN COOPER

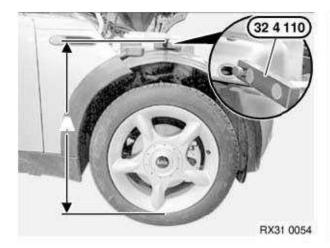




Fig. 30: Ride Height Measurement Tool Courtesy of BMW OF NORTH AMERICA, INC.

MINI Ride Height Tool

When measuring ride height on the MINI. Use special tool # 324 110. Due to the design of the hood on the MINI, this tool is used to simulate the lower edge of the wheel opening.

NOTE: To properly check ride height, the vehicle should be weighed down. Place 2 x 68 kg on front seats (seats in central position), 1 x 14 kg in luggage compartment (center) and full fuel tank.

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Alignment Specifications

The alignment specifications can be found in Technical Data under Group 32. There is a slight difference in terminology between this information and the information found on most alignment equipment. The following text should be helpful in understanding the different terms used. The alignment specifications are shown on the opposing page:

- Front Toe The Total Toe specification represents the left and right toe specs added together. Toe is measured in degrees and minutes.
- Front Camber Camber is also measured in degrees and minutes. Camber is adjustable only a some vehicles. The maximum amount of Camber adjustment is approximately .5 +/- degrees.
- Track Differential Angle with 20O lock on inside wheel This angle is also known as "Toe Out on Turns". With the inside wheel turned to 20 degrees on the front turn plates, the difference in the toe angle should be as specified.
- Caster Caster must be measured by sweeping the wheel through an arc of 10-20 degrees. (Most alignment equipment requires at least 20 degrees). Ride height is crucial to this specification. If the vehicle is too high or low in the rear, the Caster measurement will be affected. Caster is NOT a "live angle", the wheels must be reswept to check the measurement again. Although Caster is NOT adjustable, it should always be checked to insure there is no "hidden damage".
- Front Wheel Displacement More commonly known as "Setback", this is a measurement of the angle formed between the front axle to the Geometric Axis. The front axle centerline should be at 90 degrees to the Geometric Axis. A quick check of setback is to look to see if the wheel is centered in the wheel opening. Setback is a good diagnostic angle, if the Caster is off, the Setback measurement could indicate the cause. Look for bent suspension components or damaged suspension carrier/subframe.
- Maximum Wheel Lock Also known as "Maximum Steering Angle". This is the maximum angle of the wheels when turned to the inward and outward lock position. When this measurement is out of specification, check to see if the steering rack or steering box is centered. This can cause a hazardous condition and premature tire wear.
- Rear Toe Just as with front toe, this is the combined measurement of the rear left and right toe. Rear Toe is also measured in Degrees and Minutes.
- Rear Camber Rear Camber is not adjustable.
- Geometrical Axis Deviation The Geometrical Axis Deviation is also known as the "Thrust Angle". The optimum angle is zero degrees. The Thrust Angle is the angle formed between the Geometric Centerline and the Thrust Line which is the imaginary line which bisects the rear toe angle. A Thrust Angle of Zero Degrees is Optimal.

Depending upon the type of alignment equipment used, the specifications can be expressed a number of ways. Whenever possible, set the alignment equipment to read in degrees and minutes. Some alignment equipment has this option, this is more desirable than trying to convert from inches to degrees etc.

The alignment angles are expressed in degrees and minutes.

For example: 6° 30' is expressed as 6 degrees, 30 minutes.

There are 360 degrees in a circle and 60 minutes to each degree. The are also 6 seconds to each minute, but adjustments this fine are rarely used.

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Alignment Checklist

1.	Pre-Alignment Road Test	Complete
	Notes:	
2.	Perform Complete Vehicle Inspection	
	Notes:	
3.	Check Air Pressure and Set to Specification	
	Notes:	
4.	Install Specified Weight	
	Notes:	
5.	Install Alignment Sensors	
	Notes:	
6.	Compensate Sensors - If Needed	
	Notes:	
7.	Lower Vehicle and Jounce - If Needed	
	Notes:	
8.	Check Ride Height	
	Notes:	
9.	Perform Alignment	
	Notes:	
10.	Calibrate Steering Angle Sensor (DSC III)	
11.	Post Alignment Road Test	
	Notes:	

Fig. 31: Alignment Checklist (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

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Vehicle:	Mode	Model Year:		Chassis #:	
Front Suspension Type	e:				
Adjustments:					
Front Caster: Yes No	Tool #		Front Camber: \	/es No Tool#	
Front Toe: Yes No	Tool #				
Rear Suspension Type	::				
Rear Camber: Yes N	o Tool#		RearToe: Yes No	Tool #	
Suspension Variant: (C	ircle One)				
A. Series B	3. Sports	C.	Sport Plus	D. Sport JOHN COOPER	
Vehicle Loading (weig	ht):				
Front Right: k	g.		Front Left:	kg.	
Rear Seat:k	g.		Trunk: kg.		
Ride Height Specificat	tion:	Front		Rear	
Ride Height Actual:		Front		Rear	
Tire Pressure Specific	Tire Pressure Actual:				
Wheel Bearing Play: _					
Alignment Equipment	Туре:				
Alignment Head Type:					
Notes:					

Fig. 32: Alignment Checklist (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING

The MINI features a power assisted steering system (EHPS) on all models. The steering rack is of conventional rack and pinion design. The steering column has two collapsible mechanisms and tilt adjustment. The twin spoke steering wheel is common to all models although there are small differences depending on the model and equipment level. The steering column has 54 mm of tilt adjustment manually controlled by a lever beneath the

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column. The electrically driven power steering pump is the main difference.

Purpose of the System

The Steering System is designed to offer smooth operation with maximum feedback to the driver. The Electro Hydraulic Power Steering, driven by an electric motor rather than the conventional belt, conserves valuable engine power and provides a 3% savings in fuel economy.

The main components of the steering system are:

- Electro Hydraulic Power Steering Pump (EHPS
- Rack and Pinion
- Steering Column
- Steering Wheel
- EHPS Cooling Fan

System Components

EHPS

All models and derivatives are equipped with Electro Hydraulic Power Steering (EHPS). This system uses an electric motor to drive the hydraulic pump. This replaces the customary design whereby the pump is permanently driven from the engine via the auxiliary belt.



- 1. Steering Pump Assembly
- 2. Connectors
- 3. Oil Inlet
- 4. Oil Outlet
- Support Bracket

EHPS Motor Assembly

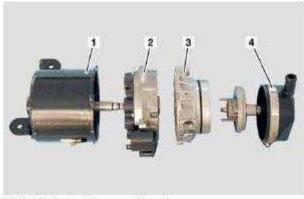
Fig. 33: EHPS Motor Assembly Courtesy of BMW OF NORTH AMERICA, INC.

The EHPS motor weighing 5.5 kg is mounted by four rubber insulators and is positioned in front of the steering rack.

The hydraulic pump displaces 1.25cm 3/revolution developing a pressure of 105 bar at a maximum pump motor

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speed of 4,200 rpm. The hydraulic pump has an incorporated pressure relief valve. The smaller metal pipe from the aluminum bodied pump is the high pressure side and the flexible pipe fitted to the plastic reservoir on the pump is the low pressure side. There is a small reservoir fitted to the end of the pump with a remote reservoir fitted to the bulkhead. The system is filled with Pentosin CHF 11 S. For top-up and refill use the same oil.



EHPS Motor/Pump Housings

- 1. Motor Housing
- 2. Brush Housing
- 3. Pump Housing
- 4. Reservoir cover

Fig. 34: EHPS Motor/Pump Housings Courtesy of BMW OF NORTH AMERICA, INC.



EHPS Motor/Pump Internal Components

- 1. Motor Pump Shaft
- 2. Motor Windings
- 3. Brushes
- 4. Pump Seal Groove
- 5. Link shaft
- 6. Oil Pump Assembly
- 7. PAS Fluid Inlet

Fig. 35: EHPS Motor/Pump Internal Components Courtesy of BMW OF NORTH AMERICA, INC.

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Remote Reservoir

<u>Fig. 36: Remote Reservoir</u> Courtesy of BMW OF NORTH AMERICA, INC.

Rack and Pinion

The Steering Rack is mounted on the front subframe and is of conventional power assisted rack design. The rack is 2.56 turns lock to lock.

Steering Column

The steering column is mounted on a one-piece aluminum bracket attached to the cross car beam. The steering column features two collapsible mechanisms, the upper part sliding away from the driver and the lower part telescoping to allow for movement of the engine and sub-frame during an impact.

Vehicles equipped with DSC have a steering angle sensor fitted to the lower end of the upper column. The data is transmitted to the DSC control unit via the CAN bus.



1. Steering Angle Sensor

Steering Column Assembly

Fig. 37: Steering Column Assembly Courtesy of BMW OF NORTH AMERICA, INC.

A grommet with an integral bearing seals the column to the bulkhead and provides additional support at the bottom of the column. A "Yoke" type joint secured by a nut and bolt secures the column to steering rack pinion.

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The ignition switch, steering lock cylinder and gearbox interlock (ECVT cars only) is mounted on the steering column tube. The interlock prevents the ignition key from being removed until the ECVT lever is in the Park position.

A slip clutch is fitted beside the steering lock detent pin. If force is exerted on the steering wheel, this prevents the detent pin from shearing off. This improves anti-theft protection. To reduce weight the column/lock assembly is made from pressure die cast magnesium.

The rotary coupler for the airbag is attached to the steering column switch unit. This is screwed to the top of the column.

The steering column has a tilt mechanism that allows the steering wheel to move 27 mm up and down from the center. Thus providing a total tilt adjustment of 54 mm. Adjustment is made by means of a lever located under the column cover. The column is counterbalanced by two springs, one either side of the column.

Steering Wheel

All models feature a two-spoke steering wheel. The MINI COPPER rim is vinyl. The MINI COOPER S (and optional MINI COOPER) steering wheel is leather trimmed. The diameter of the steering wheel is 370 mm. The steering wheel airbag module has a capacity of 57 liters and is a two-stage bag.

There are a number of functions that can be performed without the driver having to remove his/her hands from the steering wheel. Situated on the outside of the two spokes are the horn push buttons, these are on all steering wheels on all derivatives.

Cruise control and audio system buttons are also located on the steering wheel.



Steering Wheel

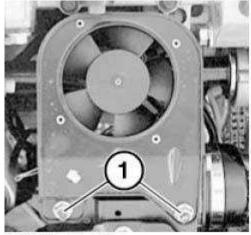
Fig. 38: Steering Wheel Courtesy of BMW OF NORTH AMERICA, INC.

EHPS Cooling Fan

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A small electric fan is used to cool off the EHPS. It is mounted on rubber bushing to the subframe to prevent vibrations from transmitting to the chassis.

There is no connection nor communication between the EHPS and the cooling fan. The EHPS cooling fan power is supplied from a relay that is activated by the "same" wire that supplies power to the engine cooling fan. When the EMS2000 activates the engine cooling fan, the EHPS also gets power up. See COOLING FAN CIRCUIT, DUAL STAGE under **COOLING FAN**.



EHPS Cooling Fan

Fig. 39: EHPS Cooling Fan
Courtesy of BMW OF NORTH AMERICA, INC.

Principle of Operation

There are two modes of operation for the EHPS: no steering assistance and steering assistance.

With the engine running and no steering assistance required the pump operates at approximately 80% capacity at a speed of 3,500 rpm. Movement of the steering changes the hydraulic pressure within the circuit which in turn affects the operation of the pump, this is identified at the control electronics by the increase in current, the pump speed is increased to 4,500 rpm and now operates at full (100%) capacity.

The unit's DC motor, is capable of drawing a maximum current of 120 Amperes, but running at an average 11.5 Amperes, powers the system. In standby mode with the engine running but the vehicle stationary the draw is 7.0 Amperes $\pm 10\%$.

PRINCIPLE OF OPERATION

THE COLUMN TERMINATION				
Condition	Current (Amps)			
Standby Mode	7.0			
Average Consumption	11.5			
Maximum Assist	120			

The EHPS consists of two connections:

2002-07 GENINFO Steering and Suspension - Overview - MINI

- 2-pin cable connection
 - o KL30
 - o KL31
- 3-pin connector
 - o KL15
 - o KL61 (used to determine if the engine is running)
 - o Diagnosis bus (used for communication with the control electronics integrated in the pump)

The pump motor is activated only if the engine is running. If the pump overheats the pump will reduce output to 80%. If the temperature keeps rising, the pump will eventually shut down to protect itself (electronics) from damage.

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00 ELECTRONIC CHASSIS ALIGNMENT

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- o Diarrhoea
- o Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

• Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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- Impaired sight
- o Irritation of the eyes
- o Reddening of the skin
- o Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eyerinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start may ensue.

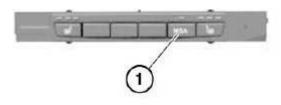
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

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R61 1948

Fig. 1: Identifying Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

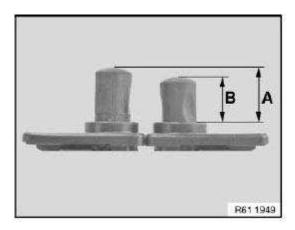


Fig. 2: Identifying Engine Hood Dimension Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: <u>DANGER OF POISONING</u> if oil is ingested/absorbed through the skin!

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RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

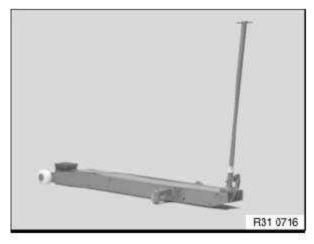
- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00 RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

- 1. Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.
- 2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
- 3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

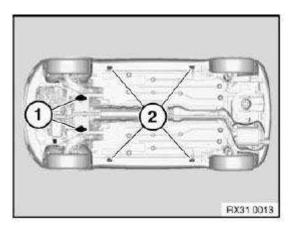


<u>Fig. 3: Identifying Trolley Jacks</u> Courtesy of BMW OF NORTH AMERICA, INC.

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WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

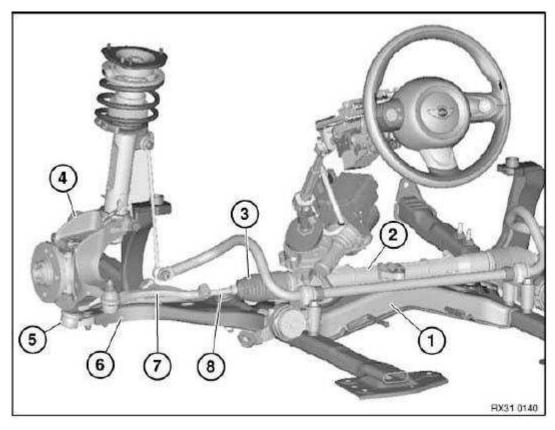
- 1. Side of front axle subframe
- 2. Side car jacking points



<u>Fig. 4: Identifying Vehicle Jacking Points</u> Courtesy of BMW OF NORTH AMERICA, INC.

31 00 ... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

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<u>Fig. 5: Identifying Front Axle + Steering Components</u> Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check must be carried out after the following work:

- Release of following screw/bolt connections:
 - Steering gear to front axle carrier
 - Wheel control joint to control arm
 - Tie rod end to tie rod
- Replacement of following parts:
 - 1. Front axle carrier
 - 2. Steering gear
 - 3. Gaiter (if the tie rod end has to be screwed off)
 - 4. Swivel bearing
 - 5. Wheel guide joint
 - 6. Control arm
 - 7. Tie rod end
 - 8. Tie rod

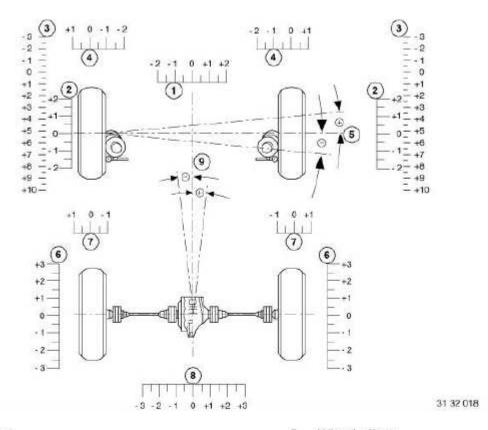
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CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE

Check adherence to test conditions		
I V		
Position vehicle on measuring stand		
I V		
Measure vehicle ride height	OK ->	Carry out chassis/wheel alignment check without load
Read off setpoint value in KDS Tolerance -20 / +40 mm per wheel permissible Difference between left / right max. 10 mm permissible		
Not OK / no data I V		
Move vehicle into normal position		
Introduce load and measure ride heights		
Read off setpoint value in KDS Tolerance ± 10 mm per wheel permissible Difference between left / right max. 10 mm permissible	Not OK -	
OK I V		Check suspension for damage, repair if necessary
Move vehicle into design position	<- Not OK	
Add/distribute weights and measure ride heights		
Read off setpoint value in KDS Tolerance ± 2 mm per wheel permissible Difference between left / right max. 2 mm permissible		
I V		
Carry out chassis/wheel alignment check with DIN load		

32 00 ... GENERAL CHASSIS AND SUSPENSION DEFINITIONS

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- Toe
- Camber
- Caster (with 10° or 20° wheel lock)
- Toe angle difference (with 20° wheel lock)
- 5. Wheel offset
- Camber
- Rear-wheel position
- 8. Toe
- Geometrical axis

<u>Fig. 6: Chassis And Suspension Angle Chart</u> Courtesy of BMW OF NORTH AMERICA, INC.

32 00 ... GENERAL INFORMATION AND DEFINITIONS

Toe angle difference

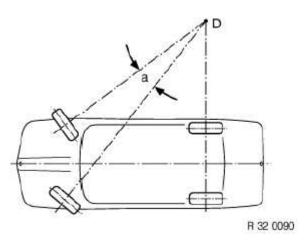
a Toe angle difference

D Center point of operating circle

The toe angle difference is the angle adjustment of the inner cornering wheel relative to the outer cornering wheel when negotiating a curve. Steering is designed in such a way that angular position of wheels changes as steering lock progresses.

A correctly adjusted toe angle difference produces equal values for left and right lock with consideration of factory tolerances. Toe angle difference provides information on corresponding operation of steering trapezoid for left or right steering lock from center position.

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<u>Fig. 7: Identifying Toe Angle</u> Courtesy of BMW OF NORTH AMERICA, INC.

Camber

Inclination of the wheel from the perpendicular.

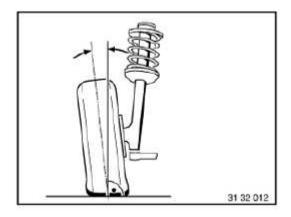


Fig. 8: Identifying Camber Angle Courtesy of BMW OF NORTH AMERICA, INC.

Toe

Reduction in distance of front of front wheels to rear of front wheels. The toe-in prevents the wheels from moving apart during driving and thus:

- the wheels from vibrating and grinding
- excessive tire wear
- excessive strain on the steering linkage and its links/joints
- heavy vehicle steering

Measurement is performed in "straight-ahead mode".

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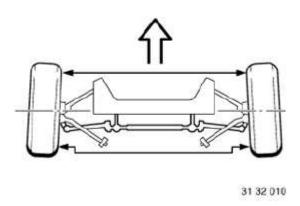
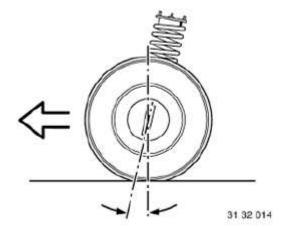


Fig. 9: Identifying Toe Angle Courtesy of BMW OF NORTH AMERICA, INC.

Caster

Is the inclination of the kingpin in the direction of travel viewed from the side. The line through the center point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

Thanks to caster, wheels are pulled and not pushed. In a similar manner to king pin inclination, when driving in curves or around corners, returning forces are reproduced to help return wheels to straight-ahead position.



<u>Fig. 10: Identifying Caster Angle</u> Courtesy of BMW OF NORTH AMERICA, INC.

Geometrical axis 1

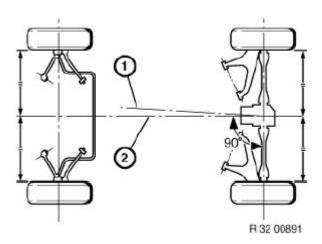
Is the angle bisector from the total rear-wheel toe.

Front-wheel measurements are taken in reference to this axis

Symmetrical axis 2

Center line running through front and rear axles.

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<u>Fig. 11: Identifying Geometrical Axis Angle</u> Courtesy of BMW OF NORTH AMERICA, INC.

Wheel offset

Angle by which one front wheel is displaced more towards front or rear than the other front wheel. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear

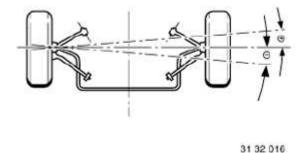


Fig. 12: Identifying Wheel Offset Angle Courtesy of BMW OF NORTH AMERICA, INC.

Kingpin offset/scrub radius

Is the distance from the center of the wheel contact face to the intersection point of the kingpin extension. The line through the center point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

The scrub radius is influenced by camber, kingpin angle and wheel offset of the wheel rim.

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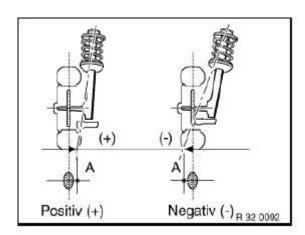


Fig. 13: Identifying Kingpin Offset/Scrub Radius Angle Courtesy of BMW OF NORTH AMERICA, INC.

32 00 ... IDENTIFICATION OF SUSPENSION WITHOUT LABEL

NOTE:

If the front spring strut does not have a label for suspension identification, the type of suspension can be identified from the part number in the Electronic Parts Catalogue.

32 00 ... INFORMATION ON REPLACING STEERING GEAR AFTER ACCIDENT DAMAGE

Facts:

In the event of accidents or driving conditions similar to accidents, shocklike loads can cause different types of damage to steering gears. When a steering gear is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering gear and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure:

The steering gear must be replaced if one or more of the following points apply:

- A. Visible or noticeable damage to the steering gear
- B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic assistance)
- C. Permissible tolerances exceeded during axle/wheel alignment check (if necessary, include alignment record with invoice / report)
- D. Fire damage
- E. Damage, permanent deformation or fractures to:

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- Wheel rims in the event of a negative result from the wheel/axle alignment check
- o Spring struts, steering knuckles, wheel carriers
- Control arms
- o Compression or tension struts or stabilizer bars with this function
- o Body-side screwing/bolting points for wheel guide/control components
- o Front axle carrier
- Pitman arms
- o Tie rods
- Steering gear fixtures
- Steering column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE:

If the steering gear replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

IMPORTANT: The vehicle's type approval will be invalidated whenever the function of any of its safety components is compromised!

32 00 ... MOVING VEHICLE INTO DESIGN POSITION

Necessary preliminary tasks:

- Move <u>VEHICLE INTO NORMAL POSITION</u>
- Add/distribute weights in area of spring struts until the vehicle ride height is within the tolerance.

Measure **VEHICLE RIDE HEIGHT**

32 00 ... MOVING VEHICLE INTO NORMAL POSITION

Necessary preliminary tasks:

- Check compliance with **TEST CONDITIONS**, bring vehicle to a stop if necessary.
- Check vehicle interior and luggage compartment (incl. luggage compartment recess) for load, unload vehicle if necessary
- Introduce DIN load (refer to <u>CHASSIS/WHEEL ALIGNMENT NORMAL POSITION R56</u>) into vehicle
- Determine **VEHICLE RIDE HEIGHT**

NOTE: If the vehicle ride height is not inside the tolerance (refer to CHASSIS/WHEEL ALIGNMENT - NORMAL POSITION R56), the vehicle

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must be repaired (coil spring/leakage).

32 00 ... PERFORMING RIM RUNOUT COMPENSATION

NOTE:

Rim runout compensation involves electronically recording the lateral runout of the rim and the possible clamping error of the quick-clamping unit for one wheel rotation and compensating the toe and camber for measurement/alignment.

Raise body.

Perform rim runout compensation in accordance with equipment manufacturer's instructions.

Compress/deflect car.

32 00 ... TEST CONDITIONS FOR CHASSIS/WHEEL ALIGNMENT CHECK

Observe the following test conditions prior to the chassis/wheel alignment check:

- 1. Correct and identical rim and tyre sizes.
- 2. Correct tread depth. The tread depth for each axle may differ from left to right by max. 3-4 mm.
- 3. Correct tyre inflation pressure (see instruction plate on car).
- 4. Wheel bearing clearance OK
- 5. Steering backlash OK
- 6. Condition of suspension and shock absorbers OK

32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION

IMPORTANT: Carry out chassis/wheel alignment with DIN load only:

- A. if the technical requirements for alignment with ride height input are not in place
- B. if, in spite of repairs having been carried out, the car's ride height between the left and right sides is still outside the tolerance
- C. if the vehicles in question have been involved in an accident

NOTE:

- Read and comply with **GENERAL INFORMATION AND DEFINITIONS**.
- Read and comply with **GENERAL CHASSIS DEFINITION**.
- If necessary, prepare lifting platform.
- Drive vehicle onto lifting platform.

NOTE: The front and rear wheels must be positioned centrally on the rotary and

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sliding plates.

• Remove locking pins from both rotary and sliding plates, align pickup using bubble level and activate

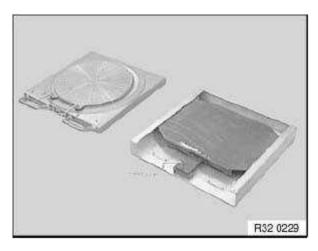


Fig. 14: Identifying Lifting Platform
Courtesy of BMW OF NORTH AMERICA, INC.

- Attach quick-clamping holder/quick-clamping unit to vehicle and remove clamping levers in area of front wheels
- Attach pickup to quick-clamping holder/quick-clamping unit, align using bubble level and connect to rotary plates

NOTE: When using quick-clamping units, perform <u>RIM RUNOUT COMPENSATION</u> after installing the pickups.



Fig. 15: Identifying Quick-Clamping Holder/Quick-Clamping Unit Courtesy of BMW OF NORTH AMERICA, INC.

• If necessary, attach spoiler adapter.

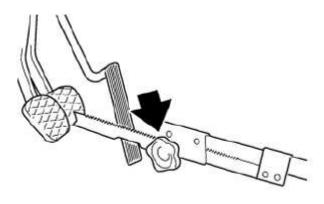
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R32 0241

<u>Fig. 16: Identifying Spoiler Adapter</u> Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, switch on chassis alignment system
- Enter customer and vehicle data
- Identify **CHASSIS VERSION** and select vehicle
- Enter tyre pressure and tread depth
- Move <u>VEHICLE INTO DESIGN POSITION</u>
- Install brake tensioner.



31 34 021

Fig. 17: Locating Brake Tensioner Courtesy of BMW OF NORTH AMERICA, INC.

- Perform input measurement in accordance with equipment manufacturer's instructions.
- Compare **SPECIFIED VALUES** with actual values.

Only in event of customer complaint (e.g. poor driving performance):

IMPORTANT: Do not remove screws/bolts (front axle carrier to engine carrier / body).

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Slacken all screws/bolts (front axle carrier to engine carrier / body) and then retighten to specified torque.

Refer to **LOWERING FRONT AXLE CARRIER**.

- If necessary, adjust front axle and rear axle. See <u>ADJUSTING TOE-IN ON FRONT AXLE</u> and <u>ADJUSTING REAR AXLE</u>.
- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Version with Dynamic Stability Control (DSC): Carry out <u>STEERING ANGLE SENSOR</u> ADJUSTMENT
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system

32 00 155 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD

IMPORTANT: Do not carry out chassis/wheel alignment without load:

- A. if the technical requirements for alignment with ride height input are not in place
- B. if, in spite of repairs having been carried out, the car's ride height between the left and right sides is still outside the tolerance
- C. if the vehicles in question have been involved in an accident

NOTE:

- Read and comply with **GENERAL INFORMATION AND DEFINITIONS**.
- Read and comply with **GENERAL CHASSIS DEFINITION**.
- Check compliance with **TEST CONDITIONS**, bring vehicle to a stop if necessary.
- If necessary, prepare lifting platform.
- Drive vehicle onto lifting platform.

NOTE: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

• Remove locking pins from both rotary and sliding plates, align pickup using bubble level and activate

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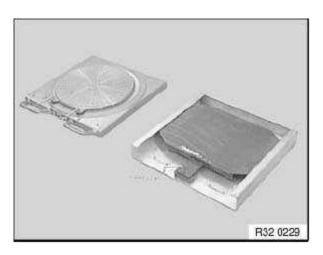


Fig. 18: Identifying Lifting Platform
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, switch on chassis alignment system
- Enter customer and vehicle data
- Identify **CHASSIS VERSION** and select vehicle
- Enter tyre pressure and tread depth
- Measure and enter **VEHICLE RIDE HEIGHT**
- Attach quick-clamping holder/quick-clamping unit to vehicle and remove clamping levers in area of front wheels
- Attach pickup to quick-clamping holder/quick-clamping unit, align using bubble level and connect to rotary plates

NOTE: When using quick-clamping units, perform <u>RIM RUNOUT COMPENSATION</u> after installing the pickups.



Fig. 19: Identifying Quick-Clamping Holder/Quick-Clamping Unit Courtesy of BMW OF NORTH AMERICA, INC.

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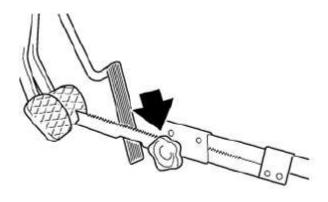
• If necessary, attach spoiler adapter.



R32 0241

Fig. 20: Identifying Spoiler Adapter Courtesy of BMW OF NORTH AMERICA, INC.

• Install brake tensioner.



31 34 021

Fig. 21: Locating Brake Tensioner Courtesy of BMW OF NORTH AMERICA, INC.

- Perform input measurement in accordance with equipment manufacturer's instructions.
- Compare **SPECIFIED VALUES** with actual values

Only in event of customer complaint (e.g. poor driving performance):

IMPORTANT: Do not remove screws/bolts (front axle carrier to engine carrier / body).

Slacken all screws/bolts (front axle carrier to engine carrier / body) and then retighten to specified torque.

Refer to **LOWERING FRONT AXLE CARRIER**.

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- If necessary, adjust front axle and rear axle . See <u>ADJUSTING TOE-IN ON FRONT AXLE</u> and **ADJUSTING REAR AXLE**.
- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Version with Dynamic Stability Control (DSC): Carry out <u>STEERING ANGLE SENSOR</u> ADJUSTMENT
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system

32 00 601 ADJUSTING TOE-IN ON FRONT AXLE

NOTE: If wheel camber is not in the setpoint value range, it is necessary to carry out troubleshooting.

Adjusting toe: Move wheels and steering gear to straight-ahead position.

Release screw (1).

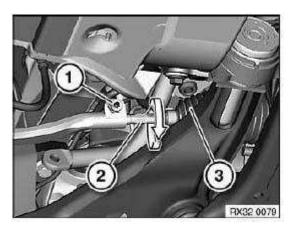
Adjust toe-in to specified value by turning tie rod at hexagon (2).

Installation:

Make sure that gaiter (3) of tie rod does not turn as well.

Installation:

Tightening torque: 32 21 2AZ . See **STEERING ARMS** for specs.



<u>Fig. 22: Identifying Gaiter And Screw</u> Courtesy of BMW OF NORTH AMERICA, INC.

32 00 620 ADJUSTING REAR AXLE

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Special tools required:

• <u>32 4 200</u>

NOTE:

A camber change always means a toe change as well. The camber must therefore be adjusted first.

If wheel camber and toe-in cannot be adjust within specified range: Troubleshooting on rear axle.

Adjusting camber:

IMPORTANT:

Observe following sequence:

- Raise car (wheels free)
- Slacken screw (1).
- Adjust camber by turning eccentric disk (2) in direction of max. positive (wheel at bottom is at max. in relation to centre of car)
- Tighten screw (1) slightly
- Lower vehicle and compress.
- Slacken screw (1) and adjust camber by turning eccentric disk (2) to setpoint value
- Tighten down screw (1)

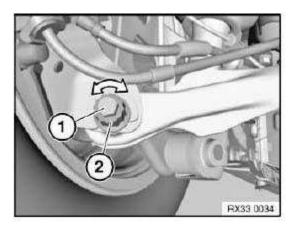


Fig. 23: Identifying Eccentric Disk And Screw Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque: 33 32 1AZ . See **CONTROL ARMS AND STRUTS** for specs.

Adjusting toe:

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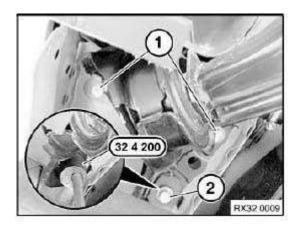
Loosen bolts (1) and (2) by approx. 1.5 turns at mounting bracket.

Place special tool 32 4 200 on bolt (2).

Turn special tool 32 4 200 and set toe-in to specified value.

Installation:

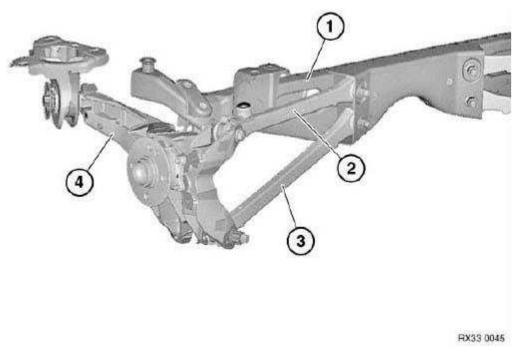
Tightening torque: 33 32 5AZ . See **CONTROL ARMS AND STRUTS** for specs.



<u>Fig. 24: Identifying Special Tool (32 4 200)</u> Courtesy of BMW OF NORTH AMERICA, INC.

33 00... REAR AXLE: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

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<u>Fig. 25: Identifying Rear Axle Components</u> Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check must be carried out after the following work:

- Release of following screw/bolt connections:
 - Rear axle carrier to body
 - Bearing block to body
 - Upper control arm to rear axle carrier
 - Lower control arm to rear axle carrier / trailing arm
- Replacement of following parts:
 - 1. Rear axle carrier
 - 2. Upper control arm
 - 3. Lower control arm
 - 4. Trailing arm / bearing block / rubber mount

51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM

Special tools required:

- 00 2 261
- <u>00 2 262</u>

WARNING: Danger to life!

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Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down.

Observe the following directions and instructions when handling the special tool:

- 1. Prior to each use, check the special tools for defects, modifications and operational reliability.
- 2. Damaged/modified special tools must not be used!
- 3. No changes or modifications may be made to the special tools!
- 4. Keep special tools dry, clean and free of grease.
- 5. Impact screwdrivers may not be used!

IMPORTANT: Risk of corrosion!

Touch up paintwork damage.

Re-establish wax layer.

Remove vehicle jack fixture with a suitable tool from side frame.

Installation:

Check fixture for damage, replace if necessary.

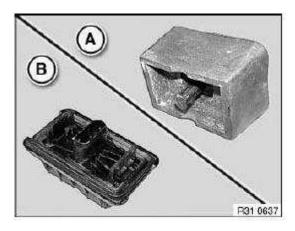


Fig. 26: Identifying Fixture Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Following states can be selected on special tool 00 2 261.

- A. Vehicle unsecured
- B. Vehicle secured (after special tool is lashed to lifting platform arm)

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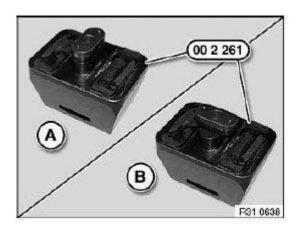


Fig. 27: Identifying Special Tool (00 2 261) Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following procedure must always be carried out on the left and right sides.

Insert special tool 00 2 261 into opening in side frame with 3/8" extension and secure ratchet to body. To do so, turn lock through 90° up to stop.

WARNING: Danger to life!

Check stopping of special tool 00 2 261 on side frame, correct attachment if necessary.

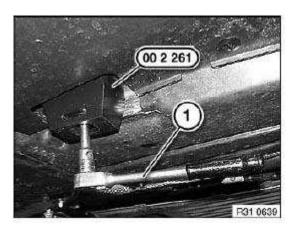


Fig. 28: Identifying Special Tool (00 2 261) Courtesy of BMW OF NORTH AMERICA, INC.

Lash special tool 00 2 261 with tensioning strap 00 2 262 crosswise (as pictured) to lifting platform arm.

WARNING: Danger to life!

Carry out tensile and visual inspection of tensioning strap 00 2 262,

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correct position if necessary.

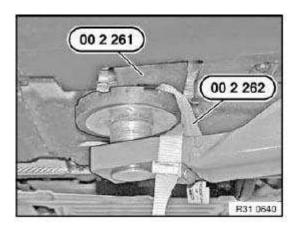


Fig. 29: Identifying Special Tool (00 2 261) And (00 2 262) Courtesy of BMW OF NORTH AMERICA, INC.

61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT

NOTE: Steering angle sensor adjustment must be carried out:

- · after adjustment work on the front axle/steering
- · after all mechanical work on the steering system
- after replacement / coding / programming of the following components:
 - Steering column switch cluster
 - Dynamic Stability Control (DSC) control unit

Connect vehicle to BMW diagnosis system.

Select and carry out steering angle sensor adjustment under Service functions.

11 MECHANICAL STEERING GEAR

32 11 ... INSTRUCTIONS FOR REMOVING AND INSTALLING EAR CLIPS

Special tools required:

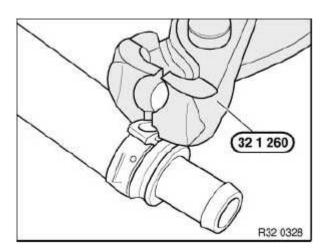
32 1 260

NOTE: The work steps are show on assorted components.

Ear clip must always be replaced.

To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

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<u>Fig. 30: Identifying Special Tool 32 1 260</u> Courtesy of BMW OF NORTH AMERICA, INC.

The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

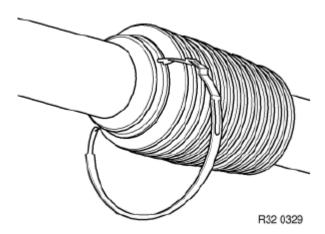


Fig. 31: Identifying Ear Clip Courtesy of BMW OF NORTH AMERICA, INC.

Attach hook fastener and press ear together with special tool 32 1 260.

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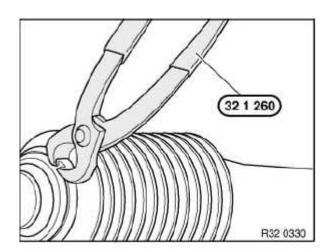


Fig. 32: Identifying Special Tool 32 1 260 (1 Of 2) Courtesy of BMW OF NORTH AMERICA, INC.

Side cutter of special tool 32 1 260 can be used in areas which are difficult to access.

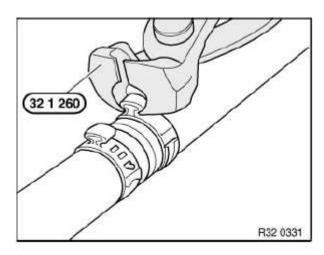
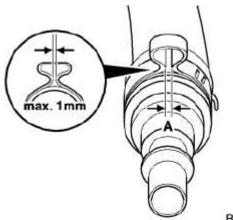


Fig. 33: Identifying Special Tool 32 1 260 (2 Of 2) Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Gap (A) max. 1 mm!

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R32 0332

Fig. 34: Identifying Ear Clip Gap Courtesy of BMW OF NORTH AMERICA, INC.

32 11 100 REPLACING GAITER FOR STEERING GEAR ON LEFT OR RIGHT

IMPORTANT: The steering gear must be replaced if the polished surface of the rack is damaged (e.g. corrosion)!

Necessary preliminary tasks:

• Remove **TIE ROD END**.

Clean tie rod.

Release **EAR CLIP** (1).

Installation:

Clean rack and check surface for damage (e.g. by corrosion).

Grease rack

Replace ear clip (1).

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Fig. 35: Identifying Ear Clip Courtesy of BMW OF NORTH AMERICA, INC.

Release band clamp (1) and detach gaiter (2) from tie rod.

Installation:

Clean tie rod and apply grease to taper.

NOTE: This ensures that the gaiter is not rotated when the tie rod is rotated.

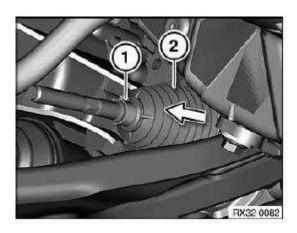


Fig. 36: Identifying Clamp And Gaiter Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check. See <u>CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE</u>, <u>KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION</u>, and <u>KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT</u> <u>WITHOUT LOAD</u>.
- Version with Dynamic Stability Control (DSC): Carry out <u>STEERING ANGLE SENSOR</u> ADJUSTMENT

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NOTE:

Only cars with DSC are fitted with a steering angle sensor (integrated in the steering column switch cluster).

13 STEERING GEAR WITH SERVO UNIT

32 13 070 REMOVING AND INSTALLING/REPLACING ELECTRIC STEERING GEAR (EPS)

IMPORTANT: Steering gear:

Check connection of steering gear for corrosion, clean contacts if necessary. The steering gear must be replaced if the corrosion is too far advanced.

Connecting cable:

In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting cable. If the insulation reveals any noticeable/striking features, it will be necessary to replace the part. Otherwise it will be sufficient to replace the contacts or plug housing.

NOTE:

In a warranty case you must always provide a fault memory printout, even where there is no fault memory entry, with the defective part.

Necessary preliminary tasks:

• Disconnect battery negative lead

NOTE: High-current-carrying lead laid with permanent positive connection (80 A fuse protection).

- Remove both <u>TIE ROD ENDS FROM SWIVEL BEARING</u>
- Replacement: Remove **BOTH TIE RODS FROM STEERING GEAR.**
- Lower **FRONT AXLE SUPPORT**

Release screws (1).

Installation:

Tightening torque: 32 00 1AZ . See **STEERING** for specs.

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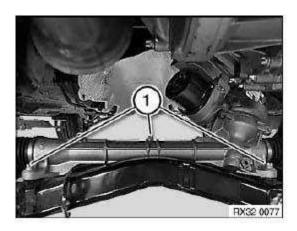


Fig. 37: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The control head of the electric steering gear (EPS) must not under any circumstances strike other components!

Collision with other components may result in damage to the electric steering gear (EPS)!

First swing steering gear (1) in direction of travel to right and then remove towards front.

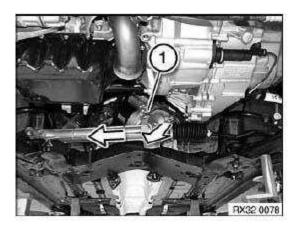


Fig. 38: Identifying Swing Steering Gear Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

IMPORTANT: On cars with 18" tyres, it will be necessary to install steering stop limiters to be ordered separately!

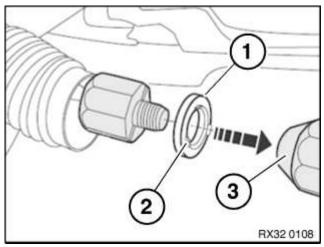
Remove **BOTH TIE RODS ON STEERING GEAR.**

Remove both steering top limiters (1).

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Installation:

Deformation elements (2) must point to steering gear (3).



<u>Fig. 39: Identifying Steering Top Limiter, Deformation Elements, And Steering Gear</u> Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Replacement only: Carry out PROGRAMMING/CODING
- Perform chassis alignment check. See <u>CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE</u>, <u>KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION</u>, and <u>KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT</u> WITHOUT LOAD.
- Version with Dynamic Stability Control (DSC): Carry out <u>STEERING ANGLE SENSOR</u> ADJUSTMENT

NOTE: Only cars with DSC are fitted with a steering angle sensor (integrated in the steering column switch cluster).

21 STEERING ARMS, TIE RODS, STEERING DAMPER

32 21 151 REPLACING LEFT OR RIGHT TIE ROD

Special tools required:

• 32 3 090

NOTE: If the tie rod end to tie rod screw/bolt connection is released, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

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• Remove **FRONT WHEEL**

Unfasten nut

Force tie rod end off swivel bearing with special tool 32 3 090.

Installation:

Keep tie rod end to swivel bearing connection clean and free from oil and grease.

Replace self-locking nuts

Tightening torque 32 21 1AZ . See **STEERING ARMS** for specs.

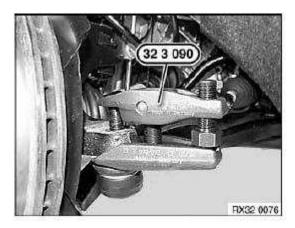


Fig. 40: Identifying Special Tool (32 3 090)
Courtesy of BMW OF NORTH AMERICA, INC.

Mark thread depth of tie rod end to simplify subsequent adjustment of front axle.

Release screw (1)

Screw off tie rod end (2); if necessary, grip tie rod with open-end wrench.

Installation:

Check **GAITER** for damage, replace if necessary.

Screw tie rod end onto tie rod up to marking.

Tightening torque 32 21 2AZ . See **STEERING ARMS** for specs.

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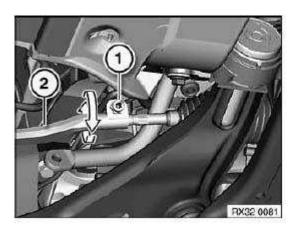


Fig. 41: Identifying Screw And Tie Rod End Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform chassis alignment check. See <u>CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE</u>, <u>KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION</u>, and <u>KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT</u> WITHOUT LOAD.
- Version with Dynamic Stability Control (DSC): Carry out <u>STEERING ANGLE SENSOR</u> <u>ADJUSTMENT</u>

NOTE: Only cars with DSC are fitted with a steering angle sensor (integrated in the steering column switch cluster).

32 21 231 REPLACING (REMOVING AND INSTALLING) LEFT OR RIGHT TIE ROD

Special tools required:

• <u>32 3 210</u>

IMPORTANT: The steering gear must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

Necessary preliminary tasks:

- Remove <u>TIE ROD END FROM SWIVEL BEARING</u>
- Remove **GAITER FROM POWER STEERING GEAR** and slide back

IMPORTANT: To avoid damage to rack and to suspension mounting, move rack in as far as possible.

Release joint with special tool 32 3 090 and 32 WAF socket (1) on steering gear rack..

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Installation:

Clean rack.

Check surface of rack for damage (e.g. corrosion).

Grease toothed area of rack

Tightening torque 32 21 3AZ . See **STEERING ARMS** for specs.

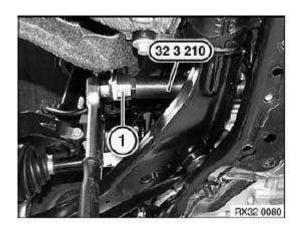


Fig. 42: Identifying Special Tool (32 3 210)
Courtesy of BMW OF NORTH AMERICA, INC.

On replacement, assemble new part with gaiter:

• Determine measurement (A) to simplify following adjustment of front axle

Installation:

Slacken clamping screw (1) and screw off tie rod end.

Slide gaiter with ear clip and band clamp on tie rod.

Screw in tie rod end to measurement (A).

Tightening torque 32 21 2AZ . See **STEERING ARMS** for specs.

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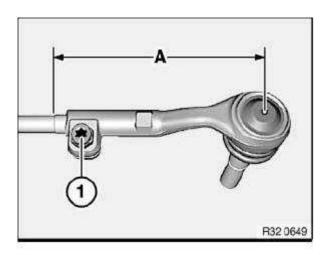


Fig. 43: Identifying Tie Rod End Measurement Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Only if replacing/removing tie rod end: Perform chassis alignment check. See CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE, KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION, and KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD.
- Version with Dynamic Stability Control (DSC): Carry out <u>STEERING ANGLE SENSOR</u> <u>ADJUSTMENT</u>

NOTE: Only cars with DSC are fitted with a steering angle sensor (integrated in the steering column switch cluster).

31 STEERING COLUMN

32 31 004 REMOVING AND INSTALLING/REPLACING UPPER SECTION OF STEERING COLUMN TRIM

Necessary preliminary tasks:

- Remove STEERING WHEEL
- If necessary, remove **REVCOUNTER FROM STEERING COLUMN**

IMPORTANT: Risk of damage!

Unclip steering column trim (1) towards top and pull out towards front.

NOTE: Gently press in upper section of steering column trim in area of clips.

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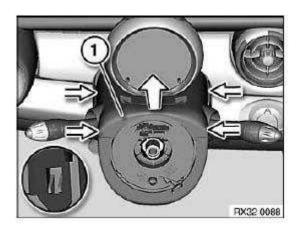


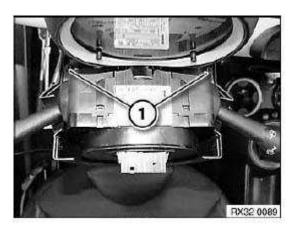
Fig. 44: Identifying Steering Column Trim
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 020 REMOVING AND INSTALLING/REPLACING LOWER SECTION OF STEERING COLUMN TRIM

Necessary preliminary tasks:

- Remove <u>UPPER SECTION OF STEERING COLUMN TRIM</u>
- Remove **LOWER TRIM FROM INSTRUMENT PANEL**

Release screws (1).



<u>Fig. 45: Identifying Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on left and right

Remove steering column trim (2); if necessary, unclip lead for steering column switch cluster.

Installation:

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Tightening torques 32 31 1AZ . See **STEERING COLUMN** for specs.

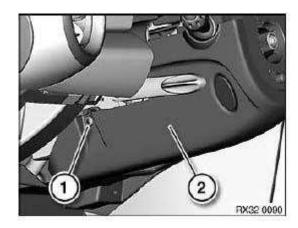


Fig. 46: Identifying Screws And Steering Column Trim Courtesy of BMW OF NORTH AMERICA, INC.

32 31 082 REMOVING AND INSTALLING/REPLACING STEERING ANGLE SENSOR

NOTE: Steering angle sensor is only fitted in cars with Dynamic Stability Control (DSC).

Steering angle sensor is integrated in STEERING COLUMN SWITCH CLUSTER.

After installation:

- Replacement only: Carry out **PROGRAMMING/CODING**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

32 31 087 REMOVING AND INSTALLING/REPLACING STEERING COLUMN LOCK

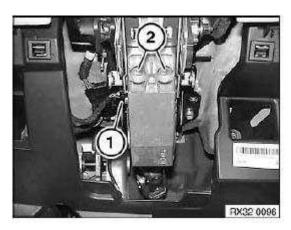
Necessary preliminary tasks:

• Remove **LOWER SECTION OF STEERING COLUMN TRIM**

Disconnect plug connection (1).

Release shear screws (2) and remove steering column lock (3).

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<u>Fig. 47: Identifying Shear Screws And Steering Column Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

32 31 090 REMOVING AND INSTALLING/REPLACING STEERING COLUMN

Necessary preliminary tasks:

- Remove **LOWER SECTION OF STEERING COLUMN TRIM**
- Remove **REVCOUNTER**

IMPORTANT: If the steering spindle is separated from the steering gear, this can result in damage to the steering column switch cluster when the steering wheel is turned!

Release screw (1).

Detach lower section of steering spindle (2) from steering gear and swing towards rear.

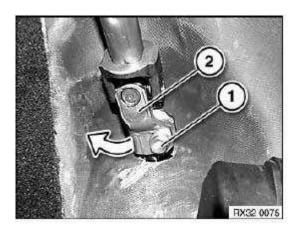
Installation:

Clean thread to remove all remnants of screw securing adhesive.

Replace screw.

Tightening torques 32 31 2AZ . See **STEERING COLUMN** for specs.

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<u>Fig. 48: Identifying Screw And Swing Lower Steering Spindle Section</u> Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) on steering column switch cluster.

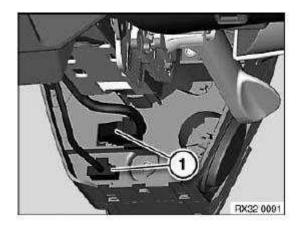


Fig. 49: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release screws (2) and remove complete steering column towards rear.

Installation:

Replace screws.

Tightening torques 32 31 3AZ . See **STEERING COLUMN** for specs.

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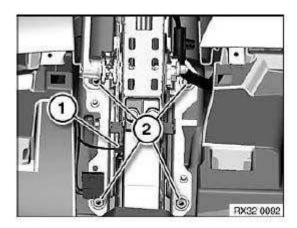


Fig. 50: Identifying Screws And Plug Connection Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

• Modify **STEERING COLUMN SWITCH CLUSTER**

After installation:

 Version with Dynamic Stability Control (DSC): Carry out <u>STEERING ANGLE SENSOR</u> <u>ADJUSTMENT</u>

NOTE: Only cars with DSC are fitted with a steering angle sensor (integrated in the steering column switch cluster).

33 STEERING WHEEL

32 33... REPLACING LOWER SPORT STEERING WHEEL TRIM

Necessary preliminary tasks:

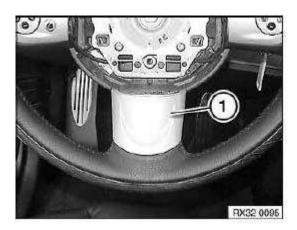
• Remove <u>AIRBAG UNIT</u>

Press trim (1) of sport steering wheel with a suitable tool.

Installation:

Trim is particularly sensitive to scratching.

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<u>Fig. 51: Identifying Shear Screws And Steering Column Lock</u> Courtesy of BMW OF NORTH AMERICA, INC.

32 33 000 REMOVING AND INSTALLING / REPLACING STEERING WHEEL

Necessary preliminary tasks:

• Remove airbag unit . See <u>REMOVING AND INSTALLING/REPLACING AIRBAG UNIT</u> or REMOVING AND INSTALLING/REPLACING AIRBAG UNIT (SPORT STEERING WHEEL).

Set road wheels/steering wheel to straight-ahead position.

Disconnect plug connection (1).

Release screw (2) and remove steering wheel.

Installation:

Tightening torque: 32 33 1AZ . See **STEERING WHEEL** for specs.

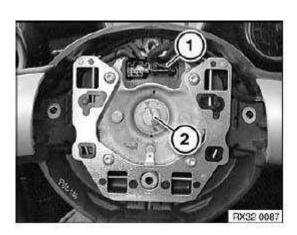


Fig. 52: Identifying Plug Connection And Screw Courtesy of BMW OF NORTH AMERICA, INC.

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IMPORTANT: Steering wheel can only be attached in one position.

With the steering wheel removed, it is important for the road wheel to remain in the straight-ahead position; if necessary, secure coil spring against turning.

Replacement:

- Modify **SHIFT PADDLES**
- Modify MULTIFUNCTION STEERING WHEEL SWITCHES/SPOKE COVERS
- Modify LOWER SPORT STEERING WHEEL TRIM

34 STEERING WHEEL FOR AIRBAG

32 34 020 REMOVING AND INSTALLING/REPLACING AIRBAG UNIT

WARNING: Observe the following instructions to avoid any risk of injury by the airbag unit.

- Comply with <u>SAFETY REGULATIONS</u> for handling components with gas generators.
- o Do not exert any force on the airbag unit.
- Use only specified tools for releasing the airbag unit.

NOTE: Improper handling may trigger the airbag and thereby cause serious injury.

IMPORTANT: <u>STEERING WHEEL</u> must be replaced if airbag unit has been triggered!

Follow PROCEDURE AFTER AIRBAG TRIGGERING.

Necessary preliminary tasks:

• Disconnect battery negative lead

Insert Torx screwdriver T25 (1) into central opening on steering wheel and press upwards in direction of arrow until airbag unit (2) is unlocked.

NOTE: See next picture (Fig. 54) for better depiction of unlocking.

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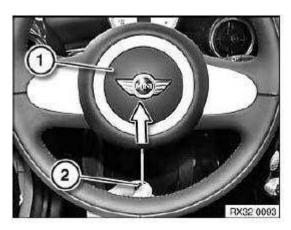
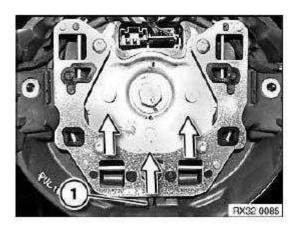


Fig. 53: Identifying Torx Screwdriver T25 And Airbag Unit Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Press Torx screwdriver (1) upwards.

In this way, the retaining clip is pressed upwards and the airbag unit unlocked.



<u>Fig. 54: Identifying Torx Screwdriver</u> Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!

Airbag unit may only be set down with the airbag itself facing upwards .

Disconnect plug connection (1).

Disconnect ground cable (2) and remove airbag unit.

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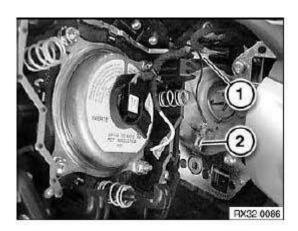


Fig. 55: Identifying Plug Connection And Ground Cable Courtesy of BMW OF NORTH AMERICA, INC.

32 34 030 REMOVING AND INSTALLING/REPLACING AIRBAG UNIT (SPORT STEERING WHEEL)

WARNING: Observe the following instructions to avoid any risk of injury by the airbag unit.

- Comply with <u>SAFETY REGULATIONS</u> for handling components with gas generators.
- Do not exert any force on the airbag unit.
- o Use only specified tools for releasing the airbag unit.

NOTE: Improper handling may trigger the airbag and thereby cause serious injury.

IMPORTANT: <u>STEERING WHEEL</u> must be replaced if airbag unit has been triggered!

Follow PROCEDURE AFTER AIRBAG TRIGGERING.

Necessary preliminary tasks:

• Disconnect battery negative lead

Insert Torx screwdriver T25 (1) into central opening on steering wheel and press upwards in direction of arrow until airbag unit (2) is unlocked.

NOTE: See next picture (<u>Fig. 57</u>) for better depiction of unlocking.

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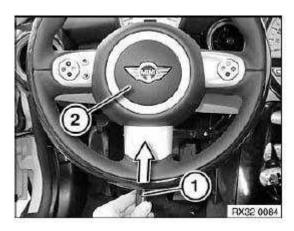
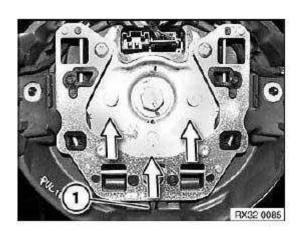


Fig. 56: Identifying Torx Screwdriver T25 And Airbag Unit Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Press Torx screwdriver (1) upwards.

In this way, the retaining clip is pressed upwards and the airbag unit unlocked.



<u>Fig. 57: Identifying Torx Screwdriver</u> Courtesy of BMW OF NORTH AMERICA, INC.

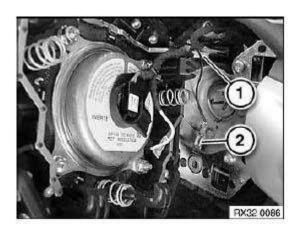
WARNING: Risk of injury!

Airbag unit may only be set down with the airbag itself facing upwards.

Disconnect plug connection (1).

Disconnect ground cable (2) and remove airbag unit.

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<u>Fig. 58: Identifying Plug Connection And Ground Cable</u> Courtesy of BMW OF NORTH AMERICA, INC.

90 TROUBLESHOOTING

32 90 ... TROUBLESHOOTING ON ELECTRIC STEERING GEAR (EPS)

TROUBLESHOOTING ON ELECTRIC STEERING GEAR (EPS) CHART

Fault	Cause	Remedy
Failure of power-assisted steering / clear reduction of power-assisted steering when stationary		NOTE: Check insulation of connecting cable for damage, replace part if necessary
		 Replace contacts and plug housing Clean contacts on steering
	Contacts corroded	gear, replace <u>STEERING</u> <u>GEAR</u> if necessary
	2. Insulation of connecting cable damaged	Check insulation of connecting cable for damage, replace part if necessary
	Refer to TROUBLESHOOTING	on front axle
Excessive steering wheel play/steering wheel shake	Screw connection, steering spindle lower section to steering gear, loose	Replace and tighten down screws (refer to REMOVING AND INSTALLING/REPLACING STEERING COLUMN)
	Journal of tie rod end deformed	Replace <u>STEERING GEAR</u> and <u>TIE ROD ENDS</u>
	Tie rod end worn	Check steering gear rack; if necessary, replace <u>STEERING</u> <u>GEAR</u> Check <u>TIE RODS</u> , replace if

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		necessary Replace TIE ROD END
	Steering gear rack damaged	Replace STEERING GEAR
	Refer to TROUBLESHOOTING	on front axle
Steering wheel inclination	Tie rod end worn	Replace TIE ROD END
	Front axle alignment incorrectly adjusted	Carry out chassis/wheel alignment check, adjust toe/track if necessary. See CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE, KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH LOAD UP TO DESIGN POSITION, and KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-HEIGHT MEASUREMENT WITHOUT LOAD.
	refer to TROUBLESHOOTING on front axle	
Interference noise when steering through (under load)	Worm gear pair or bearing positions damaged	Replace STEERING GEAR

NOTE: In a warranty case you must always provide a fault memory printout, even where there is no fault memory entry, with the defective part.

32 90... TROUBLESHOOTING ON STEERING

OBSERVE TROUBLESHOOTING ON FRONT AXLE AND ELECTRIC STEERING GEAR.

TROUBLESHOOTING ON STEERING CHART

Fault	Cause	Remedy
Excessive steering wheel play/steering wheel shake	Screw connection, steering spindle lower section to steering gear, loose	Replace and tighten down screws (refer to REMOVING AND INSTALLING/REPLACING STEERING COLUMN)
	Journal of tie rod end deformed	Replace STEERING GEAR and TIE ROD ENDS
	Tie rod end worn	Check steering gear rack; if necessary, replace STEERING GEAR
		Check <u>TIE RODS</u> , replace if necessary
		Replace TIE ROD END
	Steering gear rack	

2008 MINI Cooper	
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	damaged	Replace STEERING GEAR	
	Refer to TROUBLESHOOTING on front axle		
	Tie rod end worn	Replace TIE ROD END	
		Carry out chassis/wheel alignment check, adjust toe/track if	
	Front axle	necessary. See <u>CHASSIS/WHEEL ALIGNMENT CHECK</u>	
Steering wheel	alignment	PROCEDURE, KDS CHASSIS/WHEEL ALIGNMENT	
inclination	incorrectly	CHECK WITH LOAD UP TO DESIGN POSITION, and KDS	
	adjusted	CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE-	
		HEIGHT MEASUREMENT WITHOUT LOAD.	
	refer to TROUBLESHOOTING on front axle		

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00 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- o Diarrhoea
- o Cramps/fits
- Unconsciousness

Protective measures/rules of conduct:

- Pour oil only into appropriately marked containers
- Do not pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures:

• Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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- Impaired sight
- o Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct:

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures:

- Eye contact: Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eyerinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP SYSTEM (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

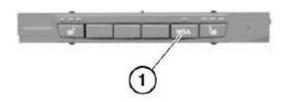
An automatic engine start may ensue.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA function is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



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Fig. 1: MSA Means Button Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode

A = 10 mm

• Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the stop before starting work and slowly release.

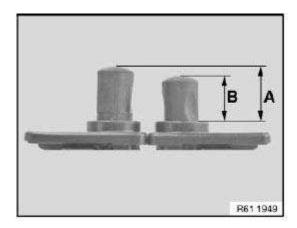


Fig. 2: Engine Hood/Bonnet Contact Setting Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools:

• Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: Danger of poisoning if oil is ingested/absorbed through the skin! See <u>00</u>

<u>Danger of poisoning if oil is ingested/absorbed through the skin</u>

Risk of injury if oil comes into contact with eyes and skin! See <u>00 Risk of injury if oil comes into contact with eyes and skin</u>

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

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- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

14 ELECTRICAL COMPONENTS

37 14 511 REPLACING FRONT RIDE-HEIGHT SENSOR

IMPORTANT: Observe safety instructions for raising the vehicle, see <u>00 LIFTING</u>
VEHICLE WITH A LIFTING PLATFORM

NOTE: Jointed rod to holder 37 14 4AZ.

Holder to control arm 37 14 5AZ.

IMPORTANT: Read and comply with 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE)

Release bolt (1).

Remove holder for ride-height sensor from front axle carrier and disconnect plug connection (3).

Installation:

Sensor lever (2) must point from ride-height sensor to left front wheel.

Tightening torque 37 14 2AZ.

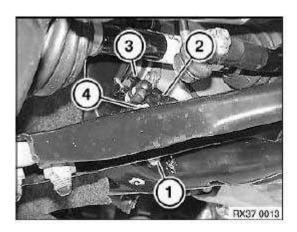
Release nut (4) and remove jointed rod from sensor lever (2).

Installation:

Replace self-locking nut.

Tightening torque 37 14 4AZ.

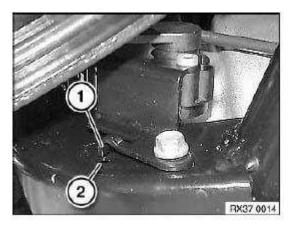
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<u>Fig. 3: Sensor Lever And Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align ride-height sensor holder by means of lug (1) to opening (2) in front axle carrier.



<u>Fig. 4: Axle Carrier</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove ride-height sensor (2).

Tightening torque 37 14 1AZ.

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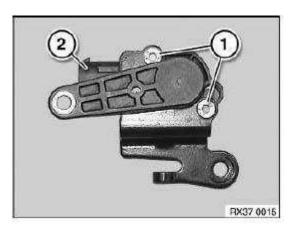


Fig. 5: Ride-Height Sensor Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

• Check headlight adjustment, correct if necessary

37 14 512 REPLACING REAR RIDE-HEIGHT SENSOR

IMPORTANT: Observe safety instructions for raising the vehicle, see <u>00 LIFTING</u>

<u>VEHICLE WITH A LIFTING PLATFORM</u>

NOTE: Ride-height sensor holder on rear axle carrier 37 14 3AZ.

Jointed rod to holder 37 14 4AZ.

Holder to upper control arm 37 14 5AZ.

IMPORTANT: Read and comply with 61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE)

Necessary preliminary tasks:

Partially detach underbody panelling

Disconnect plug connection (1).

Release nut (2) and remove jointed rod from sensor lever (3).

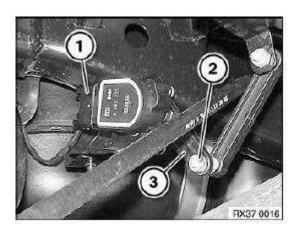
Installation:

Replace self-locking nut.

Sensor lever (3) must point from ride-height sensor to lower control arm.

Tightening torque 37 14 4AZ.

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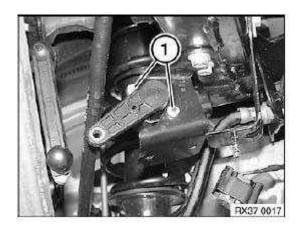


<u>Fig. 6: Sensor Lever And Plug Connection</u> Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove ride-height sensor.

Installation:

Tightening torque 37 14 1AZ.



<u>Fig. 7: Ride-Height Sensor Screws</u> Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

• Check headlight adjustment, correct if necessary

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36 WHEEL AND TIRES

KINEMATIC DIAGNOSIS SYSTEM AND ENVIRONMENT

BMW KDS (Beissbarth)



Fig. 1: BMW KDS (Beissbarth)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Foreword

1. Objectives

Wheel alignment has become an increasingly complex subject. The aim of this BMW Service Technology bulletin, therefore, is to achieve several objectives:

- o Creation of guidelines for working with the BMW Kinematic Diagnosis System (KDS).
- o Familiarization with wheel alignment technology for current vehicles and clarifying any questions which arise in this connection.

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- o Transparency and clarification of different terms.
- o Clarification of the causes of errors in the past, such that they can be avoided after reading this document.
- o Creation of conditions for dealing safely with the BMW KDS.

2. Further development of the BMW Kinematic Diagnosis System

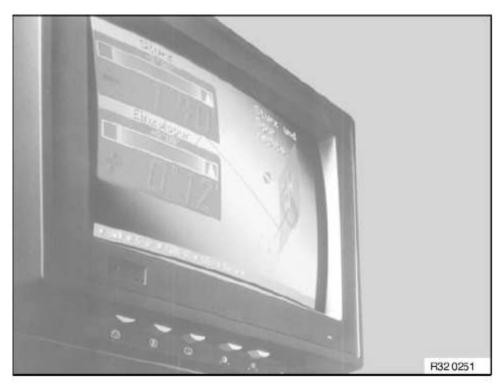
- The BMW Kinematic Diagnosis System is an integrated part of automotive system concepts. It ensures that work is carried out in a particularly rational manner which is appropriate for BMW requirements, such that you can also be certain of being prepared for future technological developments. As far as precision and performance in wheel alignment and tuning is concerned, BMW, together with leading manufacturers, has made the best of what is technically feasible: the BMW Kinematic Diagnosis System.
- o The BMW Kinematic Diagnosis System manufactured by Beissbarth is more than just the further development of conventional wheel alignment equipment. It sets new standards in precision, performance, speed and handling. It is a guarantor for the perfection which

BMW service customers rely on.

- Ride comfort, road safety and tire wear depend to a large extent on the perfect interplay of the vehicle's kinematic functions. BMW is constantly launching new generations of chassis which are even better than their predecessors. This is why there are fewer kinematics system adjusting points and narrower tolerances when measuring and tuning the chassis.
- With the use of the multi-link rear suspension and the E36, the electronic wheel alignment devices are no longer suitable for BMW wheel alignment purposes. This applies to both the measuring procedure and measuring precision. The generation of equipment which was approved with the E36 series still fulfils all the requirements placed on a modern wheel alignment device, including the use of the latest computer technology.
- o Only BMW Kinematic Diagnosis Systems manufactured by Beissarth and Bosch may be used for wheel alignment.

3. Technical Data

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<u>Fig. 2: Displaying Technical Data On BMW Kinematic Diagnosis Systems</u> Courtesy of BMW OF NORTH AMERICA, INC.

TECHNICAL DATA DESCRIPTION CHART

1. Display	 17" graphic screen with high-resolution graphics (640x480 pixels with 256 colors)
2. On-screen text	o in the appropriate national language
3. Wheel dimensions	o 12"20"
4. Vehicle memory locations	o unlimited
5. Rotating plates	 Loadbearing capacity 1000 kg, angle of rotation ± 360°, 450 x 450 x 50 mm (L x W x H), sliding range ± 50 mm, weight 18 kg
6. Sliding plates	\circ Loadbearing capacity 1000 kg, angle of rotation \pm 10°, 450 x 450 x 50mm (L x W x H),
	sliding range ± 65 mm, weight 17 kg
7. Electrical connection	 100115 V / 220240 V 50/60 Hz, 0.5 kW (other connections on request)

4. Scope of delivery

- 1 PC display device with graphic screen, graphical tablet, small or large equipment cabinet including automatic charging station, DIN A4 dot matrix printer
- 4 Measuring sensors with CCD camera technology and infrared data transmission with built-

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- in power supply
- 1 Cable set (comprising 4 cables)
- 1 Brake clamping device
- 1 Steering lock device
- 2 Electronic precision rotating plates with integrated sensor without access ramps
- 2 Sliding plates without access ramps
- 4 BMW quick-clamping units, comprising a P8-68 locating bell and P267 01 quick-acting clamp including coated holding claws
- 1 Operating instructions for BMW KDS (8 languages)
- 1 BMW software and the BMW vehicle setpoint data with setting screens as well as text for the measurement preparations

5. Accessories required

- 2 Locating rods for positioning the vehicle
- 1 Set of sand bags for the prescribed loading

6. Accessories recommended

- 4 Quick-clamping units
- 2 Sets of access ramps
- 1 Remote control / display
- 1 Trolley (for ballast bags, rotating and sliding plates and 4 quick-acting clamps)

2. Measuring options using the BMW Kinematic Diagnosis System

1. Front axle

- o Toe-in (single and total toe-in in relation to the geometrical drive axis)
- o Camber (with steering wheel pointing straight ahead)
- Wheel displacement (in relation to the left-hand front wheel)
- o Castor, kingpin inclination and toe-differential angle

2. Rear axle

- Toe-in (single and total toe-in in relation to the longitudinal center plane of the vehicle--> previously called symmetrical axis)
- o Geometrical drive axis
- o Camber

3. Other measuring options

- o Rear wheel displacement
- Wheelbase difference
- o Lateral displacement on right
- o Lateral displacement on left
- o Track difference
- Axial displacement

3. System description

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1. BMW Kinematic Diagnosis System 1, based on the Beissbarth ML4000

microline 4000 system concept

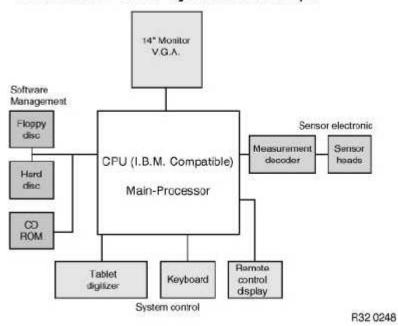


Fig. 3: Microline 4000 System Concept Courtesy of BMW OF NORTH AMERICA, INC.

The KDS 1 is available in two different designs at no extra charge:

1. Mobile workstation



<u>Fig. 4: Mobile Workstation</u> Courtesy of BMW OF NORTH AMERICA, INC.

2. Mobile compact cabinet

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Fig. 5: Mobile Compact Cabinet Courtesy of BMW OF NORTH AMERICA, INC.

The larger workstation offers a small storage area for accessories, while the compact cabinet is mobile and ideal for restricted working areas. Both variants can be supplied as a cableless measuring system (infrared). From the point of view of measuring technology, there is only a difference in the handling and equipping of the system. For both designs, the four measuring sensors are stored in integrated inserts with rechargeable battery charging points. When automatically charged over night, the measuring sensor batteries provide enough power for 10 hours of continuous use.

2. Computer

• The KDS 1 system comprises tested and reliable industrial components. The computer is an IBM-compatible, 32-bit Intel processor with CD ROM drive to the industry standard.



<u>Fig. 6: Computer</u> Courtesy of BMW OF NORTH AMERICA, INC.

3. Graphical tablet

o All functions are shown in graphical form on a "pictogram" panel. The panel is protected by

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a plexiglass cover. It can easily be replaced if more extensive design modifications are necessary. The operator interface has no membrane and is thus protected against damage. The main functions are activated by clicking the icon with the digital pen.



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<u>Fig. 7: Graphical Tablet</u> Courtesy of BMW OF NORTH AMERICA, INC.

4. Equipment cabinet

 The PC with graphic monitor and removable operating panel, supports for the measuring sensors, the remote control and the A4 printer are integrated into the workstation. The charging station is located in the cabinet and can also be connected to the measuring sensors and the remote control using the plug-in cables (operating while simultaneously charging the batteries).

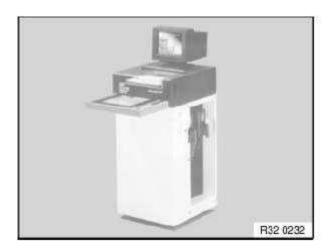


Fig. 8: Equipment Cabinet
Courtesy of BMW OF NORTH AMERICA, INC.

5. Remote display

A cableless remote display can be supplied on request. The remote control keys are only active during measuring and adjustment (not for customer data input, or if selecting a vehicle or editing

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the setpoint data etc.). The following displays are supported by the remote control:

- o Measured value with setpoint / actual comparison and tolerance bar
- Steering graphics for steering routines
- o Live overview of the track / camber values with a setpoint / actual comparison
- o Rim run-out compensation



Fig. 9: Remote Display Courtesy of BMW OF NORTH AMERICA, INC.

6. Measuring sensors with CCD camera

The measuring sensors are each equipped for automatic measurement with two CCD cameras and their own processor for the cableless infrared transmission of data with integrated batteries.

Benefits:

- No temperature deviation
- Very high measuring resolution (the track could theoretically be measured in angular seconds)
- \circ Single track range of more than \pm 9 degrees for the constant display of toe-in when changing the tie-rod ends



Fig. 10: Measuring Sensors With CCD Camera Courtesy of BMW OF NORTH AMERICA, INC.

o Exact system accuracy, i.e. when carrying out measurements at the vehicle following rim run-out compensation, the toe-in and camber measurements are accurate to 2 angular minutes

7. BMW Quick-acting clamp

0

o BMW quick-acting clamp for holding the measuring sensors precisely in position and measuring without rim run-out compensation.

NOTE: Any existing quick-acting clamps, e.g. from older F1600s or ML-3000s, must not be used on the BMW KDS.

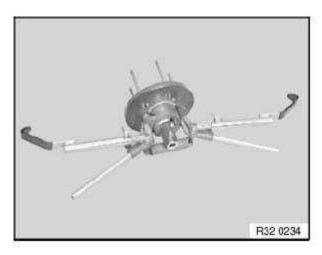


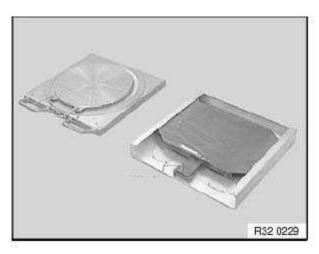
Fig. 11: BMW Quick-Acting Clamp Courtesy of BMW OF NORTH AMERICA, INC.

8. Rotating / sliding plates

 Electronic precision rotating plates for the front wheels with integrated sensor (360 degree measuring range)

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- o Stable sliding plates for the rear wheels with a swivelling / rotating top plate
- o Accessories: Cover hood for aluminium rotating plates



<u>Fig. 12: Rotating / Sliding Plates</u> Courtesy of BMW OF NORTH AMERICA, INC.

9. Sensor pins

- A new BMW light alloy wheel (styling no. 18) has been available as optional equipment from April 1993. When measurements are being made on vehicles with these wheels, new sensor pins are required for the quick acting clamps of the recommended wheel alignment equipment.
- The new sensor pins are included in the scope of supply for new deliveries of KDS 1 (order number: BS 90 19 11).

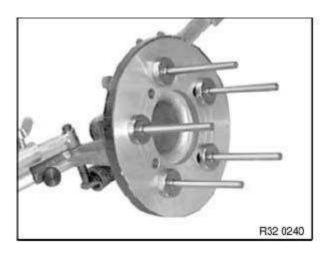


Fig. 13: Sensor Pins Courtesy of BMW OF NORTH AMERICA, INC.

10. Spoiler adapter

o In the case of vehicles with very low spoilers, the sensor beam may be broken by the spoiler

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between the measuring sensors. This primarily occurs in front of the front axle.

o The spoiler adapter is used here as a connecting element between the measuring equipment clamp and the measuring sensor. Thanks to the adapter, the sensors are placed 50 mm lower, thus allowing the sensor beam to move freely below the spoiler.



R32 0241

Fig. 14: Spoiler Adapter Courtesy of BMW OF NORTH AMERICA, INC.

11. Quick-clamping units

- o Quick-clamping units for wheel alignment on non-BMW vehicles with rim run-out compensation.
- o Rims without sensors boreholes (rims for BMW vehicles from other manufacturers)

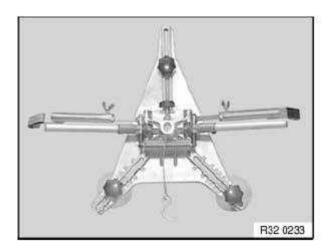


Fig. 15: Quick-Clamping Units
Courtesy of BMW OF NORTH AMERICA, INC.

12 Retainers

o The most varied clamping options for the measuring equipment are possible thanks to the versatile retainers and the rubber-coated thrust pieces, even on exotic light-alloy rims.

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R32 0242

Fig. 16: Retainers **Courtesy of BMW OF NORTH AMERICA, INC.**

4. Workstation

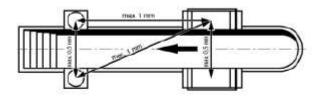
1. Environment

Description:	Requirements:
	 Wheel alignment pits
	 Pillar-type lifts with set-down device
All lifting platforms currently recommended by BMW for wheel alignment meet the requirements for the BMW KDS.	 2 plunger-type lifting platforms with set- down device
	 Repair stands with set- down device
No particular requirements have to be met in respect of the location at which the BMW KDS is used. The measuring device can be	 One measuring area (approx. 4.5 m x 7.0 m).
installed over working pits or on lifting platforms.	 The rotating plates must be pinned to the platform

The support surfaces for the rotating and sliding plates may only display the following maximum height difference:

- o from left to right ± 0.5 mm
- o from front to back ± 1.0 mm
- \circ diagonally \pm 1.0 mm.

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R32 0236

Fig. 17: Displaying Maximum Height Difference Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A difference in the height of the rotary plates of ± 2 mm from left to

right results in a measuring error of 4.8 ° in the camber.

As a comparison: The camber tolerance on the E36 is \pm 10'. The tire tread difference or varying tire pressure cause measuring errors of

the same magnitude.

2. Preconditions for alignment

When carrying out the wheel alignment, the front and rear wheels must be centered on the rotating and sliding plates in order that all wheel suspensions remain free of tension during the steering routine and adjustment work. As a result, the rotating and sliding plates for the relevant wheel bases and track widths of the vehicle to be aligned must be moved.

3. Measuring tolerance

All measuring tolerances are system tolerances. This means that the sum of all individual tolerances gives the value shown in the example. Example of camber: Quick-acting clamp + measuring sensor + computer = 1' at a measuring range of \pm 3° (all BMW vehicles are within this measuring range).

4. Levelling the measuring station

The manufacturers of the BMW KDS (Beissbarth / Bosch) are able to measure the measuring area to the required accuracy using levelling devices. Any "normal" water level is not suitable for this. Lifting platforms must be levelled under load so that the uneven deflection in the travel rails is taken into account

IMPORTANT: Adjustment work for the lifting platform concerned must be executed by a specialist (manufacturer's after sales service).

5. Chassis-related terms

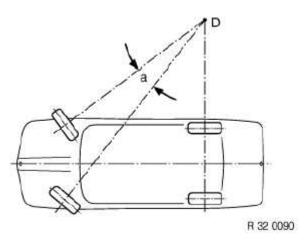
1. Toe-differential angle

o The toe-differential angle (a) is the angular position of the internal wheel on the curve in relation to the external wheel on the curve when driving round bends. The steering is designed such that the angular position of the wheels in relation to each other changes as the

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steering angle increases.

o In ideal cases, the wheel axes meet at point D in any steering position (except for straight ahead).



<u>Fig. 18: Toe-Differential Angle</u> Courtesy of BMW OF NORTH AMERICA, INC.

2. Camber

o The camber is the angle of inclination of the wheel in relation to the vertical.

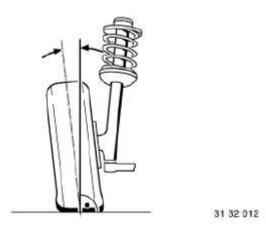


Fig. 19: Camber Courtesy of BMW OF NORTH AMERICA, INC.

3. Toe-in

• The toe-in is the reduction in the distance between the front of the wheels and the rear. The toe-in prevents the wheels from moving apart while driving (wobbling and grinding).

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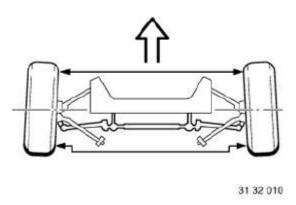
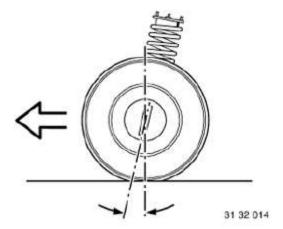


Fig. 20: Toe-In Courtesy of BMW OF NORTH AMERICA, INC.

4. Castor

 The castor is the kingpin angle seen from the side in the opposite direction of travel. The line through the center of the spring strut mount and control arm ball joint corresponds to the kingpin.

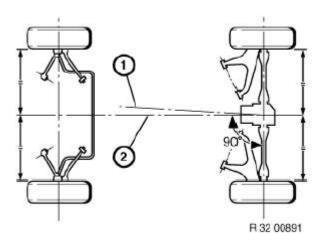


<u>Fig. 21: Castor</u> Courtesy of BMW OF NORTH AMERICA, INC.

5. Geometrical drive axis / symmetrical axis

- o (1) The geometrical drive axis is the line bisecting the angle of the overall rear wheel toe. The measurements of the front wheels relate to this axis.
- o (2) The symmetrical axis represents the center line through the front and rear axes.

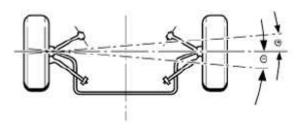
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<u>Fig. 22: Geometrical Drive Axis / Symmetrical Axis</u> Courtesy of BMW OF NORTH AMERICA, INC.

6. Wheel displacement angle

o The wheel displacement angle is the angular deviation of the connecting line of the wheel contact points in relation to a line running at 90° to the geometrical drive axis. The wheel displacement angle is positive if the right hand wheel is displaced to the front, and is negative if it is displaced to the rear.



31 32 016

Fig. 23: Wheel Displacement Angle Courtesy of BMW OF NORTH AMERICA, INC.

7. Kingpin offset

• The kingpin offset is the distance from the center of the wheel contact point to the contact point of the kingpin extrapolation.

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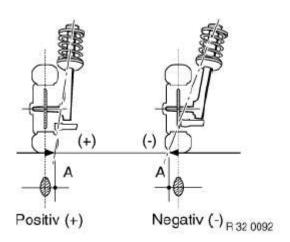


Fig. 24: Kingpin Offset Courtesy of BMW OF NORTH AMERICA, INC.

6. Wheel suspension

Those parts which connect the wheel to the mostly load-bearing floor elements of the bodywork and guide it in the required direction belong to the wheel suspension. They are connected by axles or other comparable structures and guided by the arms. The wheel suspension plays a decisive role in the handling characteristics of a vehicle. Two main groups have to be distinguished: 1. Rigid axle suspension and 2. Independent wheel suspension.

1. Rigid axle suspension

RIGID AXLE SUSPENSION SPECIFICATION

Description	Advantages	Disadvantages
The rigid axle suspension has a rigid connection between both wheels or wheel pairs. Any change in one wheel is more or less transferred to the other. It is now only fitted as a rear axle, if at all. However it is frequently used for lorries or busses.	changes to the camper or	Non-driven rear axles may also acquire negative camber as well as increasing tire lateral guidance, thus increasing tire wear.

2. Independent wheel suspension

INDEPENDENT WHEEL SUSPENSION SPECIFICATION

Description	Advantages	Disadvantages
State-of-the-art individual wheel suspension is available on BMW vehicles on the front and rear axles. This development has its cause in mass inertia, as a reduction in the nonsuspended mass improves wheel and ground contact, and the wheel stays better on the road. Control arms and trailing arms, which have to absorb high longitudinal and lateral forces to some extent, are	Wheels suspended independently from each other have no mutual influence on each other.	Depending on the type, changes may occur in the camber, wheel toe, track width, castor and wheelbase.

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required for guiding independently suspended wheels.

7. Wheel alignment / procedure

1. Measuring options

An overview of all measuring options and values (VA = front axle, HA = rear axle) is shown below.

WHEEL ALIGNMENT MEASURING OPTIONS AND VALUES

Measuring options	Measuring	In measuring	Total measuring
	accuracy	range	range
Total wheel toe $(VA + HA)$	± 2'	± 2°	± 18°
Single wheel toe $(VA + HA)$	± 2'	$\pm 2^{\circ}$	± 9°
Camber (VA + HA)	± 1'	± 3°	± 10°
Wheel displacement (VA)	± 2'	± 2°	± 9°
Geometrical drive axis	± 2'	± 2°	± 9°
Castor	± 4'	± 18°	± 22°
Kingpin inclination	± 4'	± 18°	± 22°
Toe-differential angle	± 4'	$\pm20^\circ$	± 20°
Maximum steering angle (VA)	± 4'	± 60°	± 300°
Maximum steering angle (HA)	± 4'	± 9°	± 9°
Castor correction range	± 4'	± 7°	± 10°

NOTE: The measuring accuracy details only apply when using the precision rotating and sliding plates as well as the BMW quick-acting clamps.

2. Preparatory work

Before commencing the measurement, preparatory work must be carried out at the measuring area and on the vehicle. Preparatory work includes:

- o Easy-running rotating and sliding plates
- o Aligning the rotating and sliding plates in relation to the track width and wheelbase
- o Centering the vehicle on the plates
- Applying the parking brake
- o Removing the lock pins on the plates to prevent tension in the chassis under loading
- o Checking the rim and tire size, tread depth, tire pressure, steering wheel play, wheel bearings and condition of suspension and shock absorbers
- o Fastening the measuring equipment to the wheels
- $\circ\,$ Loading the vehicle according to BMW KDS specifications
- o Rock the vehicle firmly with the brakes released to ensure a stable center position

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o Lock the service brake using the brake clamping device

3. Initial / final measurement

This measurement can be carried out as a program-guided measurement in the same way as any subsequent adjusting work and the final measurement. The sequence of the chassis measuring points to be called up is specified and controlled by the system software. The individual steps comprise:

- o Driving straight ahead to correctly record the wheel toe and camber values for the rear axle
- o Steering routine for recording the castor, kingpin inclination and toe-differential angle
- o Recording the wheel toe and camber of the front axle (adjust the steering center point in advance)
- o Steering routine for measuring the maximum steering angle on the left/right
- Checking the overview of measured values with the setpoint and actual comparison of all measured values

4. Printing out the data

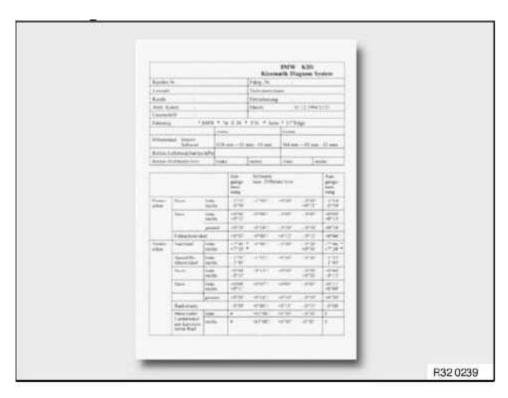


Fig. 25: Report Printout From Integrated DIN A4 Printer Courtesy of BMW OF NORTH AMERICA, INC.

The report printout from the integrated DIN A4 printer is subdivided into three sections:

• Header lines with customer and vehicle identification data --> the customer data entered before beginning the measurement as well as vehicle data are printed out here.

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- Centre section with vehicle data --> this includes the make, type, model and vehicle model year
 defined when the setpoint data record was selected. The values previously measured for height
 level, tire pressure and tread depth are also printed in this section.
- The end section with all vehicle alignment values comprises the 3 columns initial measurement, setpoint values and output measurement. The measured values are recorded separately in these three columns.

8. Special features

1. Free wheel alignment

With free wheel alignment the selection and sequence of the measuring points is freely selectable. The following points must be observed for attaining the correct measurement results:

- o Carry out all work in the same way as with the program-guided measurement.
- Before measuring the wheel toe and camber values for the rear axle, the steering must be in the "straight ahead" position to ensure that it is perfectly aligned in relation to the longitudinal center plane of the vehicle.
- o Before measuring the single wheel toe values on the front axle, the center of steering must be established to ensure the correct position of the steering wheel.

2. System settings

The following settings must only be entered or set once: language, display format, date/time, advertising text, remote control with display, rotating plate selection and printer settings. They remain stored.

9. BMW Kinematic Diagnosis System comparison (Bosch-Beissbarth)

BMW KINEMATIC DIAGNOSIS SYSTEM COMPARISON (BOSCH-BEISSBARTH)

	Bosch	Beissbarth
Measured value recording	Infrared	CCD camera
Data transmission	Cable	Infrared / cable
Measuring sensor power supply	Cable	Battery / cable
Remote control	Infrared	Infrared
Remote control with measured value display	Cable	Infrared
Setpoint data memory	Floppy disk	Hard disk
Measured value memory	Always the last vehicle measured	Unlimited vehicle memory
Operating system	-	MS-DOS
Languages	English and one language on request	EN, DE, NI, SV, IT, FR, SP (further languages can be called up)
Update	3.5" floppy disk	3.5" floppy disk using TIS/DIS
Monitor	20"	17"
Computer	-	Pentium
Disk drives	2 x floppy disk	1 x floppy, 1 x CD ROM

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10. Control modification (menu)

1. Remote control with display

The following steps show how the remote control with display is activated:

- 1. Call up the "Service" menu in special functions ("S" key)
- 2. Call up the "Remote control" sub-menu in the "Service" menu.
- 3. Select the "Remote control with display" item in the "Remote control" sub-menu this configuration is retained.

IMPORTANT: In the case of equipment without remote control, this must be configured to "No remote control".

2. Brief operating instructions

- 1. Activate the remote control with the "ON" button (it may also be switched on during alignment). The title page will appear on the LCD.
- 2. Select "Straight ahead" of the "Initial measurement", "Adjustment work" or "Final measurement" at the measuring equipment cabinet. The steering graphics for "Straight ahead" will appear on the LCD.
- 3. Use the "Forward arrow" to change to the next measurement image. Display blocks will appear on the LCD with the designation of the measured value and tolerance bar with the measured value. If the measured value is within the tolerance range, it is shown in dark figures against a light background. If the measured value is outside the tolerance range, it will be shown in inverse video (light figures against a dark background).
- 4. By pressing the "F" key shortly, you can move alternately between the designation of the measured value and the setpoint value with the tolerance inside the display blocks.
- 5. You can scroll through the measured values using the "Forward arrow", "Backward arrow" and "Cancel" (red dot) keys. The function of these keys is identical to that of the keys on the graphics panel.
- 6. Even with "Free alignment", it is possible to scroll through the measured values in the same way as with "Program-guided alignment".
- 7. During measurement, the report print-out can be initiated using the "**Printer**" key. The remote control keys are only active during measurement and adjustment (not during customer data input, vehicle selection etc.).

3. Display support

- Measured values with a setpoint/actual comparison and tolerance bar (setpoint figures can be displayed with the "F" key)
- Steering graphics for steering routines
- o Overview of measured values with current setpoint/actual comparison
- o Rim run-out compensation
- With all other functions (e.g. customer input), the title illustration appears on the LCD display

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NOTE:

If the data transmission from the remote control to the computer is interrupted, the remote control icon in the bottom right-hand corner of the screen changes color from green to red and the illustration on the LCD display is shown inversely - black turns to white, white to black. This change does not take place in the title illustration. Once the line-of-sight connection has been re-established, the remote control continues to operate from the point of interruption in the program. A continuous visual connection during alignment is therefore not necessary.

- o The "Hour glass" icon in the LCD display means: "Please wait".
- o The "Battery" icon in the top right-hand corner of the LCD display means that the battery reserve has been reached.
- o To switch off the remote control: press the "F" key for 5 seconds, then return it to its charging unit or connect it to a charge cable. The title illustration will again appear as a charging check.
- o If, during the measurement, the remote control has been placed back in the charging unit, it must be switched on again using the "ON" button.

11. Updating the software / setpoint data

Floppy disks will no longer be sent to BMW partners who have acquired a **"BMW KDS** (Beissbarth / Bosch)". For cost-related reasons, you can create these disks yourself on the **"DIS-tester"** or on the **"TIS/EPC server".** The data for this is regularly updated on the TIS CD.

1. Requirements

- o BMW KDS (Beissbarth / Bosch)
- o TIS CD program status (Beissbarth): from CD 12/95
- o EPC program status: from 12/95
- o TIS CD program status (Bosch): from CD 08/97
- o DIS program status: from V6.0
- o 3.5" diskettes, 1.44 MB (Beissbarth 5 diskettes / Bosch 1 diskette)

2. Procedure (Beissbarth)

- 1. Go to the "Administration" screen
- 2. Select the **KDS** button
- 3. Select Beissbarth
- 4. Insert "Diskette 1" on request and confirm with "OK" (program diskette 1 of 2 is created, label it)
- 5. Insert "Diskette 2" on request and confirm with "OK" (program diskette 2 of 2 is created, label it)
- 6. Insert "**Diskette 3**" on request and confirm with "**OK**" (setpoint data diskette 1 of 3 is created, label it)
- 7. Insert "Diskette 4" on request and confirm with "OK" (setpoint data diskette 2 of 3 is created, label it)

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- 8. Insert "**Diskette 5**" on request and confirm with "**OK**" (setpoint data diskette 3 of 3 is created, label it)
- 9. Perform update and/or setpoint data on the KDS in the usual manner with the diskettes which have just been created.

3. Procedure (Bosch)

- 1. Go to the "Administration" screen
- 2. Select the **KDS button**
- 3. Select **Bosch**
- 4. Label "Diskette 3.1", insert it into the drive on request and confirm with "OK" (2x) --> Setpoint data is copied to the diskettes.
- 5. Insert setpoint data diskette 3.1 into the 3.1 floppy disk drive, insert operating system diskette 3.0 into the 3.0 drive
- 6. Switch on the machine in the usual manner.

IMPORTANT: When creating the KDS diskettes, all data on the diskettes used is overwritten.

NOTE: In the event of an error, a corresponding message is shown and the program is cancelled completely. The procedure must be run from the beginning again and all data on the diskette will be deleted. A new diskette may have to be used.

12. Creating, copying and editing setpoint data

1. Copying

- o Press the "C" button and select the vehicle to be copied.
- Select the "Edit setpoint data" menu item from the special functions. Create a new vehicle
 in the usual manner. The setpoint values for the last vehicle selected will appear in the data
 input screen. Enter the data and save the data record.

2. Creating

o Press the "C" button and select the "Edit setpoint data" menu item from the special functions. Create a new vehicle in the usual manner. An empty data input screen will appear. Enter the data and save the data record.

3. Editing

o Factory-programmed setpoint data can neither be deleted nor modified. If this data does need to be modified, a new vehicle with modified setpoint data must be created. New vehicles created by the user are identified by a "+" in the selection menu. These vehicles can be deleted by the user using the "-" key or modified using the "< >" key. These keys only appear if vehicles have been entered by the user.

13. Special functions

1. Customer-specific printer report header

The sub-item "Customer-specific text" must be called up in the "Special functions" menu. An

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input screen will appear on the monitor. This input screen must be filled out with the name and address and stored with the "S" screen key. The text entered is inserted into the report header.

2. Adjusting options

- o Call up the "Service" menu in the special functions ("S" key).
- Select the "Wheel toe adjustment" item or the "Camber adjustment" item from the
 "Adjustment" sub-menu. The toe and camber adjustment program will guide the user step by
 step through the adjustment using text and images. The measuring deviation for each
 measuring sensor will be shown on the screen when the adjustment has been completed.
- You can store the adjustment values in the measuring sensor using the "Store" key or you can quit the program with the "Red dot key" without saving them (check). The adjustment values can be printed out.

3. Rotating plate test

- o Call up the "Service" menu in the special functions ("S" key).
- o Call up the "Rotating plate" item in the "Service" menu. Turn the left-hand and right-hand rotating plate and check the display on the screen.

IMPORTANT: The measuring range is ± 306 degrees.

4. Viewing and deleting customer entries from database

- o Call up the menu item "**Delete**" in the "**Database**" menu in the special functions. The data input screen will appear. Fill in the search fields with the data to be deleted.
- Use the "-" button to delete this data record. A new data record can then be highlighted and deleted with the digital pen.
- You can scroll through the entire database with the "Arrow up" and "Arrow down" keys.
- o You can quit the delete function by pressing the cancel key (red dot).

14. Modifications within program

Further modifications were carried out within the program which only slightly change the program sequence but which optimize the alignment in respect of comfort and speed. This is described below:

- o Optimization of the rim run-out compensation in respect of speed.
- Optimization of the steering routines: Highlighted values within the gate can still be corrected. The
 message "Rotating plates not connected" no longer causes the steering routine to be cancelled.
 Further measurements can be carried out after the rotating plates have been connected.
- Standardization of screen colors with the colors on the tablet.
- o Addition of texts in several foreign languages.
- o Elimination of program-related and cosmetic faults.
- o Electronic water level.
- o Omission of kingpin inclination measurement.

15. Faults

1. Tyre faults

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TYRE FAULTS

Fault	Effect
1 Wheel toe, camber, toe-differential angle and castor not correct	1 Severe tire squeaking even at relatively low speeds
2 Excessive toe-in and excessive positive camber	2 Tires are worn down on one outside edge in the longitudinal direction
3 Excessive negative camber	3 Tyre wear on inside edge
4 Worn front-axle suspension on front-wheel-drive vehicles	4 Increased noise / Vehicle pulls on one side when accelerating
5 Incorrect wheel alignment	5 Wheels scrubbing / Tyre surface shows feathering in the tread
6 Play in the suspension due to mechanical parts (suspension, steering)	6 Washout / Wobbling of front wheels
7 Tyre pressure too low	7 Outside tire surface wear

2. Front axle faults

FRONT AXLE FAULTS

Fault	Cause	Remedy
1. Toe deviation	a) Vehicle not in normal position	a) Correct height level
	b) Tie rod(s) bent	b) Replace tie rod(s)
	c) Tie rod ball joints worn	c) Replace tie rod(s)
	d) Rubber mount in control arm defective	d) Replace control arm
2. Camber deviation: The camber is fixed during the design stage and cannot be adjusted.	a) Rubber mount in control arm defective	a) Replace control arm
-	b) Control arm deformed	b) Replace control arm
	c) Spring strut deformed	c) Replace spring strut
	d) Traction strut worn	d) Replace control arm
	e) Spring deflection too great	e) Replace coil spring, height level
	f) Front axle carrier deformed	f) Replace front axle carrier
	g) Spring strut mount deformed	g) Repair forward structure
	h) Distortion in the floor assembly (engine bracket)	h) Repair body
3. Castor deviation: The castor fixed during the design stage a cannot be adjusted.	r is a) Rubber mount for tension / nd traction strut defective	a) Replace rubber mount
Ç	b) Tension / traction strut deformed	b) Replace tension / traction strut
	c) Control arm deformed	c) Replace control arm
	d) Spring strut deformed	d) Replace spring strut
	e) Wheelhouse deformed (spring	, 1 1 5

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4. Toe-differential angle deviation	strut mount) f) Distortion in the floor assembly (engine bracket) Requirement: camber and castor are correct	f) Repair body
	a) Tie rods unevenly adjusted	a) Set wheel toe on left and right to identical values
5. Wheel displacement deviation	Requirement: Front wheels have same single toe in relation to the geometrical axis	
	a) Front axle carrier deformed	a) Replace front axle carrier
	b) Engine bracket deformed	b) Repair body
	c) Control arm deformed	c) Replace control arm
	d) Tension / traction strut	d) Replace tension / traction
	deformed	strut

3. Rear axle faults

REAR AXLE FAULTS

Fault	Cause	Remedy
1. Camber deviation	a) Vehicle not in normal position: spring deflection too great	a) Correct height level
	b) Rubber mount on rear axle carrier defective	b) Replace rubber mount
	c) Rear axle carrier deformed	c) Check rear axle carrier and replace, if necessary
	d) Control arm deformed	d) Check control arm and replace, if necessary
	e) Traction strut deformed	e) Check traction strut and replace, if necessary
	f) Distortion in the floor assembly	f) Repair body
	g) Swinging arm deformed	g) Replace swinging arm
2. Rear wheel position is not correct	a) Rear axle carrier has been shifted laterally	a) Check the rubber mounts on the rear axle carrier and replace, if necessary
	b) Distortion in the floor assembly	b) Repair body
3. Toe deviation	a) Vehicle not in normal position, i.e. spring deflection too great	a) Correct height level
	b) Rubber mount in rear axle carrier defective	b) Replace rubber mount
	c) Control arm deformed	c) Replace control arm
Í		

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	d) Rubber mount and swinging arm defective	d) Replace swinging arm
	e) Rear axle carrier deformed	e) Check rear axle carrier and replace, if necessary
	f) Traction strut deformed	f) Check traction strut and replace, if necessary
4. Deviation from the geometrical drive axis	Requirement: Total wheel toe is correct	
	a) Distortion in the floor assembly	a) Repair body

Further details on the "Kinematic Diagnosis System" can be found in the operating instructions for the BMW KDS (Beissbarth / Bosch).

Functional and system descriptions are not subject to change. Parts availability and immediate ordering availability cannot be derived from this information. The specialist departments will be providing further details at the relevant time.

RUN FLAT INDICATOR

All models



Fig. 26: Run Flat Indicator

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Courtesy of BMW OF NORTH AMERICA, INC.

Introduction

The Run Flat Indicator (RPA) monitors the tire pressure throughout the journey.

The entire vehicle weight is carried by the air pressure in the tires. If the pressure in one of the tires should drop, the tire will gradually "cave in". The resulting flexing means that the defective tire will quickly receive additional damage. The tire could burst.

Some 80 % of all flat tires are caused by small holes (e.g. caused by nails). The holes result in a gradual loss of pressure in the affected tire. Many "tire blowouts" can be traced back to preliminary damage caused by a gradual loss of pressure.

A gradual loss of pressure in one tire may remain unnoticed for a long time. The lack of pressure only makes itself clearly felt when driving when the tire is almost completely empty.

As tire pressure drops, the radius of the wheel and with it the tire's rolling circumference will also decrease. The upshot is that the wheel speed of the affected tire is increased.

The RPA records the wheel speeds using the wheel-speed sensors of the Dynamic Stability Control (DSC). The RPA compares the speeds of the individual wheels and computes an average speed. In this way the RPA is able to detect a loss of tire pressure.

The RPA detects a drop in pressure below about 30 % \pm 10 % of the initial value. The RPA indicator and warning light indicates a drop in tire pressure. The RPA will indicate this after just a short distance, as a rule after a few minutes, from a certain minimum speed (e.g. 25 km/h) up to the permissible top speed.

- > Different control units for the Run Flat Indicator
- > E46 All-wheel drive
- > E46, E53, E83, E85, E86
- > E60, E61, E63, E64
- > E65, E66
- > E70
- > E87, E90, E91, E92, E93
- > R56

Despite coming from different manufacturers the systems hardly differ from one model series to the next in the way they appear to the driver (initialization, RPA indicator and warning light, characteristics, diagnosis).

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IMPORTANT: Responsibility resides with the driver at all times

Check tire pressures regularly, at least twice a month and before embarking on lengthy journeys. During initialization, the set tire pressure is taken as the initial value for the current set of tires.

If all 4 tires loose pressure at the same rate, the wheel speeds will also change at the same rate. The RPA is unable to detect a uniform drop in pressure in all tires (e.g. due to diffusion = natural loss of air from all 4 tires)

IMPORTANT: Correct function of the Run Flat Indicator is not guaranteed when the emergency wheel is fitted.

As the emergency wheel has a much smaller diameter, the correct operation of the RPA can no longer be guaranteed.

Brief description of components

The SMG system comprises the following key components:

4 wheel-speed sensors

The wheel-speed sensors of the Dynamic Stability Control (DSC) measure the wheel speeds of the individual wheels.

o RPA button

> E46, E53, E83, E85, E86

The RPA button is only needed for initializing the PRA.

(RPA initialization means "teaching the system the tire pressures").

o CID: Central Information Display

Vehicles that are equipped with CID are initialized using the CID.

o On-board computer button and rocker switch on turn-signal/main-beam switch

> E87, E90, E91, E92, E93, R56

Initialization is performed on the LCD display, using the BC button and the rocker switch on the turn-signal/main beam switch. The on-board computer functions are selected with the rocker switch.

The R56 does not have a rocker switch. The on-board computer functions are selected with the BC button.

The RPA software is in the following control units, depending on model series:

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o RPA control unit

> E46 all-wheel drive

The E46 All-wheel drive has a separate RPA control unit.

The 4 wheel-speed sensors measure the wheel speeds. The DSC control unit sends the signals through 4 direct wires to the RPA control unit.

Alternatively

o ABS control unit with additional software for Run Flat Indicator

> R56

The ABS control unit is standard equipment on the R56. RPA is integrated into the DSC control unit by means of additional software.

Alternatively

ASC+T control unit with additional software for Run Flat Indicator

> R56

ASC+T is special equipment on the R56 (ASC+T: Automatic Stability Control plus Traction). RPA is integrated into the ASC+T control unit by means of additional software.

Alternatively

- o DSC control unit with additional software for Run Flat Indicator
- > E46, E53, E60, E61, E63, E64, E70, E83, E85, E86, E87, E90, E91, E92, E93
- > R56: Optional equipment

With the DSC Mk60 and DSC 8, the RPA is integrated in the DSC control unit using additional software (The E70 is equipped with DSC 8 Premium).

Alternatively

- CIM: Chassis Integration Module
 - > E65, E66

The CIM controls:

Servotronic

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- Steering column adjustment
- Run Flat Indicator (RPA)

The following control units are involved in the Run Flat Indicator system (in alphabetical order):

o CAS: Car Access System

> E60, E61, E63, E64, E65, E66, E70, E87, E90, E91, E92, E93, R56

The CAS control unit provides input signals relating to terminal status (e.g. terminal 15 ON).

o GM: General module

> E46, E53, E83, E85, E86

The general module provides input signals relating to terminal status (e.g. terminal 15 ON).

o JBE: Junction box electronics

> E70, E87, E90, E91, E92, E93, R56

The JBE is the data interface (= gateway) between the K-CAN and the PT-CAN. (K-CAN stands for "Body Controller Area Network"; PT-CAN stands for "Powertrain Controller Area Network")

The junction box consists of the junction box electronics and the electrical distribution center.

• KGM: Body gateway module

> E60, E61, E63, E64 from 09/2005

The body gateway module (KGM) replaces the safety and gateway module (SGM).

The KGM forms the data interface (= gateway) between the K-CAN and the PT-CAN.

• M-ASK or CHAMP or CCC: Multi-audio system controller or multimedia platform or Car Communication Computer

M-ASK or CCC or CHAMP (multimedia platform: CHAMP; Central Head Unit and Multimedia Platform) issues an acoustic warning through the loudspeakers if the tire pressure should drop.

(On vehicles without M-ASK or CCC or CHAMP, the instrument cluster will emit the warning.)

• SGM: Safety and gateway module

- > E60, E61, E63, E64 up to 09/2005
- > E65, E66 from 03/2004

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The SGM is the data interface (= gateway) between the K-CAN, **byteflight** and the PT-CAN.

o SZL: Steering column switch cluster

> E87, E90, E91, E92, E93, R56

The signals from the on-board computer button and from the rocker switch are recorded and processed in the SZL. The data is transmitted to the instrument cluster (on-board computer).

ZGM: Central gateway module

> E65, E66 until 03/2004

The ZGM forms the data interface (= gateway) between the K-CAN and the PT-CAN.

KOMBI and CID: Instrument cluster and Central Information Display

A fault in the RPA or drop in tire pressure will be indicated by the RPA indicator and warning light in instrument cluster

At the same time, the symbol will light up in the LCD display.

Faults registered by the RPA are indicated as follows by the RPA indicator and warning light (for variations, please refer to **NATIONAL VERSION**):

- o The RPA indicator and warning light lights up:
- **Red** (with acoustic signal):

Drop in tire pressure more than approx. $30 \% \pm 10 \%$.

Driving safety is no longer guaranteed.

• Yellow:

RPA failed

Information about the check control message can be called up in the CID (CID is fitted depending on the vehicle's equipment).

System functions

The Run Flat Indicator (RPA) comprises the following functions:

- Self-test
- Initialization
- o Detects drop in tire pressure

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- Visual and acoustic warning
- o Actively reduce the load on the defective wheel (E70 only)

Self-test

The RPA performs a self-test when terminal 15 is switched ON. A fault in the RPA is indicated by the RPA indicator and warning light and by a symbol in the LCD display.

Initialization

Initialization is started manually (e.g. by pressing the RPA button). Once it has been started, initialization will continue through to complete calibration. This process may be interrupted any number of times.

It is important that the vehicle is driven away immediately after initialization is started. The system will not start calibration until the vehicle is driven away. Even a terminal change will not change this.

In principle, calibration is only possible while the vehicle is being driven (road speeds above 25 km/h).

Initialization will run as a fully automatic calibration sequence (after the journey has started),. In other words, the circumference of individual tires are recorded and evaluated.

To allow a drop in tire pressure to be detected, the system considers different speed ranges and driving situations. Taking account of the driving situation means that the system has to be primed for each speed range individually.

From 09/2004 (starting with E87), these speed ranges and driving situations have been combined into 3 calibration ranges. This means greater clarity for output via the BMW diagnosis systems Group Tester One (GT1) and DISplus.

The initialization phase lasts approx. 5 to 15 minutes for the individual speed ranges. The end of the initialization phase is not indicated.

A visual and acoustic warning can only be emitted in the speed ranges that have been calibrated by at least 67 percent.

The calibration process can be delayed by:

- · dynamic driving
- a road with lots of bends
- frequent changes in load (only on vehicles with electronic height control -> air spring/height control regulation)

Detects drop in tire pressure

The RPA records the wheel speeds using the wheel-speed sensors from the DSC. The RPA compares the speeds of the individual wheels and computes an average speed. In this way the RPA is able to detect a loss of tire pressure. (In the event of a tire losing pressure, the tire rolling circumference of the affected tire is also

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reduced.)

Visual and acoustic warning

A drop in pressure in one tire of approx. $30 \% \pm 10 \%$ from the initial value is indicated by the RPA indicator and warning light. In addition, an acoustic signal sounds.

Signal output: Depending on the model concerned, either via the instrument cluster or the multi-audio system controller (M-ASK) / Car Communication Computer (CCC).

NOTE: DSC malfunction

The sensors used by the RPA are all monitored by the DSC. If DSC detect a fault, the RPA will also register a malfunction.

Actively reducing load on defective wheel

> E70

If the RPA detects a flat tire on one of the rear wheels, the electronic height control will actively reduce the load on the wheel concerned. The body will then assume a slightly inclined attitude. As soon as the flat tire has been repaired and the RPA reinitialised, the inclined attitude will be levelled out again. No work is needed on the air suspension itself.

Special conditions for system function

The following **driving conditions** may cause a **delay in the warning** being given in the event of a drop in tire pressure:

- Heavy braking
- Rapid acceleration
- High rate of lateral acceleration
- o Cornering (in a tight corner)
- Vehicle speed dropping below a minimum speed (the RPA only responds when a certain minimum speed has been reached)
- o Large difference in slip (between axles or between wheel on one side of vehicle)
- o Initialization not being completed in current speed range (see "Controls")
- Winter conditions
- Heavy changes in load (only vehicles with electronic height control)

The following **operating conditions** may cause a **delay in the warning** being given in the event of a drop in tire pressure:

Driving with snow chains fitted

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Driving with snow chains may impair the correct function of the RPA.

The system will work as normal again after the snow chains have been removed and the vehicle is driven for a few minutes. (Repeat initialization not necessary.)

NOTE: Do not perform initialization when snow chains are fitted.

Initialization and snow chains will cause incorrect adaptation values.

Trailer towing

Initialization should be performed when a trailer with a weight greater than approx. 300 kg is being towed.

Repeat the initialization process after detaching or unloading the trailer.

Old/new tires

NOTE: Only fit tires with the same tread depth!

Avoid fitting tires with greatly different tread depth (from approx. 2 millimetres) on one axle. The different diameters mean that the correct operation of the RPA is no longer guaranteed.

The following situations may cause unnecessary warnings:

- Initialization not completed after a tire has been replaced (old/new tires, summer/winter tires, change in direction of rotation, or replacement of single defective tire) tire pressures have been changed
- o Tires have different levels of wear
- o Frequent changes in load (only on vehicles with electronic height control)
- o Tires that have not been approved by BMW
- o Damaged tires, even if no loss of pressure can be detected (e.g. spin imbalance)
- o Tyre has changed slightly during the running-in phase (settling)

In the following cases, the system will **not emit a warning despite a drop in tire pressure being detected:**

- The same amount of pressure is lost in 2 or more tires.
- o Drops in tire pressures caused by diffusion and affecting all 4 tires equally
- o If a tire is damaged with a sudden loss of all pressure (tire blow-out, warning is given too late)

Operation

The Run Flat Indicator (RPA) is initialized using the following control elements:

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- RPA button
- o On-board computer button on turn-signal/main-beam switch
- o With iDrive in the Central Information Display (CID) with the controller

IMPORTANT: Always perform initialization immediately after correcting the tire pressure, especially if a tire is changed or the wheels are interchanged. Only check tire pressures when the tires are cold.

Set the tires to the correct pressure before performing initialization. During initialization, the set tire pressure is taken as the initial value for the current set of wheels.

Correct the tire pressures when the tires are cold to prevent the data recorded from being affected by temperature.

IMPORTANT: Responsibility resides with the driver at all times

Check tire pressures regularly, at least twice a month and before embarking on lengthy journeys. During initialization, the set tire pressure is taken as the initial value for the current set of tires.

Initialize the RPA in the following situations:

o If tire pressure is changed

(tire pressure is corrected or reset)

- o If the position of the tires is changed (change of axles, wheels), even if the tire pressure is not changed
- o If a tire is changed or the wheels are interchanged

(e.g. old tires for new tires, summer tires for winter tires, etc.)

Start initialization as follows:

Terminal 15 ON

(engine OFF or ON, do not pull away)

- Vehicles with RPA button
 - Press and hold the RPA button until the RPA indicator and warning light lights up yellow for a few seconds
- Vehicles with BC button (on-board computer function)
 - In the on-board computer function select "RPA" and "INIT" (LCD display) with the rocker switch on the turn signal/main-beam switch. Press the BC button to confirm.
 - Press and hold the BC button for approx. 5 seconds, until a box with a tick appears behind the "INIT" display.

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> R56:

- In the on-board computer function select "SET/INFO" (LCD display in auxiliary instrument) with the BC button on the turn-signal/main-beam switch.
- Press and hold the BC button until the display changes
- Press the BC button repeatedly until the corresponding symbol and the word "RESET" are displayed.
- Press and hold the BC button until a square with a tick appears.
- o Vehicles with Central Information Display

Initialization is performed via the Central Information Display (CID) and controller.

- Select "RPA" in the "Settings" menu and confirm.
- Select "Set" and confirm.
- Drive off

The end of the initialization phase is not indicated.

Preconditions for activation

The Run flat Indicator (RPA) is automatically activated when terminal 15 is switched ON. The RPA cannot be switched off manually.

US national version

A flat tire is indicated as follows:

> E53, E83, E85, E86

Yellow RPA indicator and warning light without acoustic signal

> E60, E61, E63, E64, E65, E66, E70, E90, E91, E92, E93, R56

Yellow RPA indicator and warning light with acoustic signal

An RPA failure is indicated as follows:

Yellow RPA indicator and warning light without acoustic signal

Subject to change.

TIRES WITH EMERGENCY RUNNING CHARACTERISTICS AND TIRE PRESSURE WARNING SYSTEMS

All models

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General information

Warning systems

BMW AG offers two different systems to warn the driver of a drop in tire pressure.

WARNING SYSTEMS SPECIFICATION

System	Description	Measuring principle
RDC	Tyre pressure control	Tyre pressure/temperature
RDW	Tyre pressure warning	Comparison of wheel speeds

Emergency running systems

In addition to the warning systems, two emergency running systems are also employed to prevent a depressurized tire from caving in:

Components of emergency running system with self-supporting tires:

EMERGENCY RUNNING SYSTEMS SPECIFICATION (SELF-SUPPORTING TIRES)

RDW (standard equipment)	Tyre pressure warning
RDC (available as option from 03/2000)	Tyre pressure control
SST	S elf S upporting T ire
EH2 disc wheel	Disc wheel with E xtended H ump 2

Components of emergency running system with integrated support ring:

EMERGENCY RUNNING SYSTEMS SPECIFICATION (INTEGRATED SUPPORT RING)

Support ring	NOTE: In the future, only for heavy safety vehicles (E38/3)
RDC (optional)	Tyre pressure control
H2 disc wheel	Standard disc wheel with H ump 2

Tyre pressure control (RDC)

RDC system description

RDC permanently monitors the tire pressure and the temperature in the tires, both while the vehicle is being driven and when it is stationary. Data is transmitted via data telegram by the wheel electronic units to the antennas installed in the wheel housing and on to the RDC control unit. There, the data received is compared with the stored limit values.

After correcting the air pressure with the engine off and the ignition on, press the Set button and hold (approx. 6 seconds) until the words "Set tire pressure" appear in the instrument cluster (instrument cluster high) or the yellow LED lights up (basic instrument cluster).

If the limit values are exceeded, the driver will be warned via the instrument cluster in two stages, as follows:

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TYRE PRESSURE SPECIFICATION

Loss of tire pressure	Warning
	Yellow LED on basic instrument cluster
Drop in tire pressure of 0.2 to 0.4 bar	or
Drop in the pressure of 0.2 to 0.4 bar	Text: "Check tire pressure" on instrument cluster high
	Gong: no
	Red LED on basic instrument cluster
Drop in tire pressure of more than 0.4 bar	or
Drop in the pressure of more than 0.4 bar	Text: "Tyre failure" on instrument cluster high
	Gong: yes

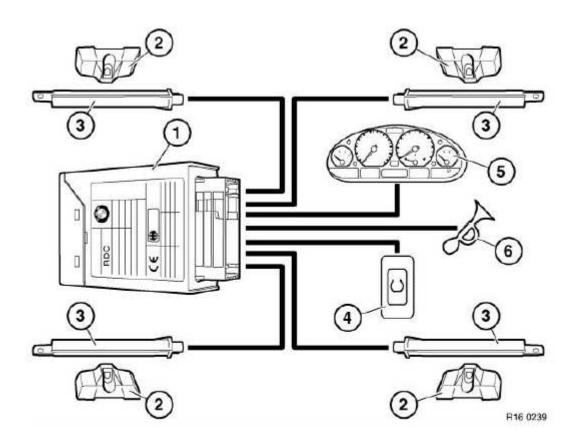
Advantages of RDC

ADVANTAGES OF RDC

1. Safety	 early warning in the event of rapid loss of pressure warning of loss of tire pressure through normal diffusion
2. Comfort	o unchanging ride comfort
2. Comfort	o instruction to check tire pressure as necessary
3. Service life,	o minimization of tire wear
economy	o minimization of fuel consumption
	o allow tires with emergency running characteristics to be fitted
4. New developments	 no spare wheel if tires with emergency running characteristics are fitted (saves weight)

RDC system layout

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- (1) RDC control unit
- (2) Wheel electronic units (4 off) Wheel electronic unit for spare wheel (optional)
- (3) Receiving antennas (4 off)

- (4) Set button
- (5) Display element
- (6) Anti-theft warning system
- Wiring harness

Fig. 27: RDC System Layout
Courtesy of BMW OF NORTH AMERICA, INC.

Component description

RDC control unit

Fully diagnosis-compatible

Task:

evaluates the following telegrams from the wheel electronic units:

- o tire pressure
- o tire air temperature
- o identification number (ID) of wheel electronic unit
- o remaining service life of wheel electronic unit battery

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If required, information or a warning is transmitted.

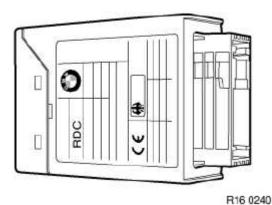
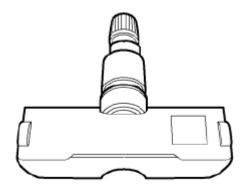


Fig. 28: RDC Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

Wheel electronic unit with valve

Components:

- o pressure sensor
- o temperature sensor
- o transmitter
 - o frequencies according to country
- o power supply
- o service life: approx. 7 years
- o not exchangeable



R16 0241

Fig. 29: Wheel Electronic Unit With Valve Courtesy of BMW OF NORTH AMERICA, INC.

Installation location of wheel electronic unit in disc wheel

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The wheel electronic unit (1) is screwed to the valve (2) on the disc wheel (3)

Identifying feature:

metal tire valves

NOTE:

Different valves have to be used to allow for the different disc wheel sizes. The valves are color-coded. The correct coding can be taken from the spare parts catalogue.

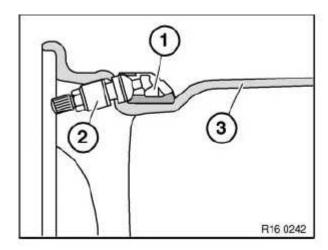


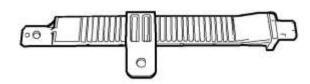
Fig. 30: Wheel Electronic Unit Installation Location In Disc Wheel Courtesy of BMW OF NORTH AMERICA, INC.

Antenna

There is an antenna in each wheel housing.

Task:

receives telegrams and forwards these to the RDC control unit.



R16 0243

Fig. 31: Antenna Courtesy of BMW OF NORTH AMERICA, INC.

Component description

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Set button

Installed in the instrument panel to the right of the steering wheel. (E46: in the center console)

Symbol: tire cross-section

Task:

initialization after resetting cold tire pressure or after changing tire or wheel location.

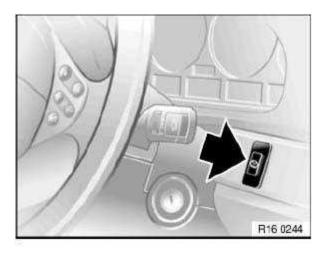
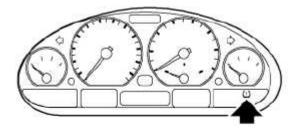


Fig. 32: Locating Set Button
Courtesy of BMW OF NORTH AMERICA, INC.

Display element in instrument cluster

Indicator lamp lights up yellow:

- drop in tire pressure of 0.2 to 0.4 barIndicator lamp lights up red:
- \circ drop in tire pressure greater than 0.4 bar



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Fig. 33: Locating Display Element In Instrument Cluster Courtesy of BMW OF NORTH AMERICA, INC.

Tyre pressure warning RDW

RDW system description

RDW measures the wheel speeds on all four wheels, using the wheel speed sensors of the ABS/ASC or ABS/DSC system. It compares the wheel speeds of the diagonally opposite wheels and of the average speed.

In the event of a drop in tire pressure, the dynamic diameter of a wheel will change, leading to a changed wheel speed.

A drop in tire pressure of 30 ± 10 % can be detected on all wheels from about 15 km/h (10 mph) up to the vehicle's top speed.

If this value is exceeded, the driver will be warned via the instrument cluster as follows:

TYRE PRESSURE SPECIFICATION

Loss of tire pressure	Warning
	Red LED
	Text: "Tyre failure"
	Gong: yes
Loss of tire pressure	The vehicle is not to be driven faster than 80 km/h (50 mph).
of $30 \pm 10 \%$	
	NOTE:
	A cautious driving style with moderate forward and transverse acceleration will help to prolong the service life of the defective tire.

Advantages of RDW

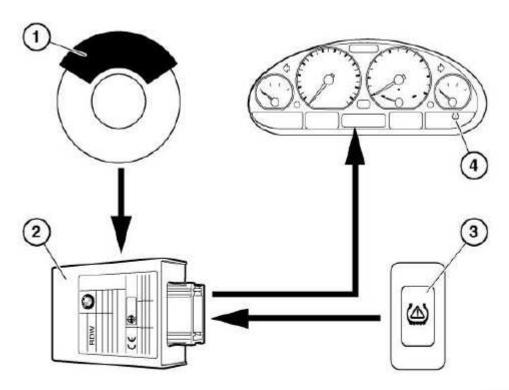
With two exceptions, the advantages of RDC also apply to RDW.

Exceptions:

- o no warning of loss of tire pressure through normal diffusion
- o tire pressure still have to be checked regularly, every 14 days

RDW system layout

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R16 0246

- Wheel speed sensors of ABS/ASC or ABS/DSC system
- ASC = Automatic Stability Control DSC = Dynamic Stability Control
- (2) RDW control unit

- (3) Set button
- (4) Display element
- Wiring harness

Fig. 34: RDW System Layout Courtesy of BMW OF NORTH AMERICA, INC.

Component description

RDW control unit

Fully diagnosis-compatible

Task:

- $\circ\;$ evaluates wheel speeds.
- o a warning is transmitted as required.

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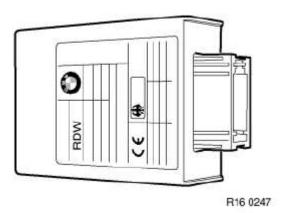


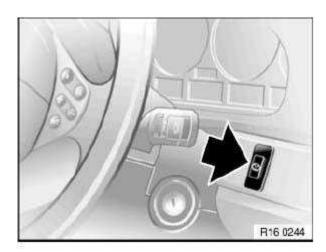
Fig. 35: RDW Control Unit Courtesy of BMW OF NORTH AMERICA, INC.

Set button

Installed in the dashboard to the right of the steering wheel. Symbol: tire cross-section with warning triangle

Task:

initialization after resetting cold tire pressure or after changing tire or wheel location.



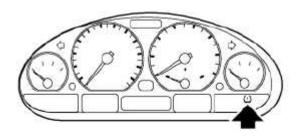
<u>Fig. 36: Locating Set Button</u> Courtesy of BMW OF NORTH AMERICA, INC.

Display element in instrument cluster

Indicator lamp lights up red:

 \circ drop in tire pressure $30 \pm 10 \%$

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R16 0245

Fig. 37: Locating Display Element In Instrument Cluster Courtesy of BMW OF NORTH AMERICA, INC.

Emergency running systems

Introduction

Tires with emergency running characteristics can still be used for a certain distance even if they suffer a complete loss of pressure. There are two different systems which meet these requirements:

- o emergency running system with self-supporting tires
- o emergency running system with integrated support ring

Emergency running systems setup

Emergency running system with self-supporting tires

The side walls of the self-supporting tire are reinforced. In conjunction with a special disc wheel, the tire can still be used for a certain distance even if it suffers a complete loss of pressure.

Mobility is retained for the following distances up to a speed of 80 km/h (50 mph) and with a cautious, suitably adapted driving style:

Unloaded vehicle max. 500 km (300 miles)

Unloaded roadster less than 250 km (150 miles)

Fully loaded vehicle max. 50 km (30 miles)

Self-supporting tires demand permanent monitoring of the tire pressure to ensure that the driver is given adequate warning if pressure is lost during a journey. For this reason, these tires are only available in conjunction with the warning system RDW and from 03/2000 also with RDC.

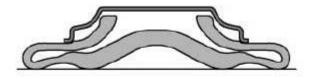
To prevent the self-supporting tires from becoming detached from the disc wheel in the event of a complete loss of tire pressure, they must be fitted to newly developed wheels with modified disc wheel humps, but with unchanged tire seating (= standard disc wheel).

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However, the new wheels can also be used for standard tires of the same size.

Comparison standard tires / self-supporting tires

Standard tires, unpressurised

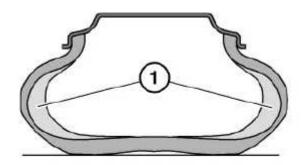


R16 0248

<u>Fig. 38: Unpressurised Standard Tires</u> Courtesy of BMW OF NORTH AMERICA, INC.

Self-supporting tires, unpressurised

Envulcanised reinforcement (1) made of a temperature-resistant rubber compound.



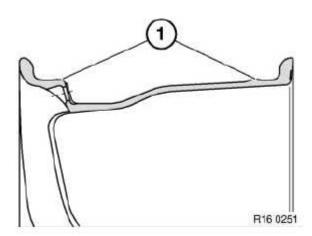
R16 0249

Fig. 39: Unpressurised Self-Supporting Tires Courtesy of BMW OF NORTH AMERICA, INC.

Disc wheels

H2 disc wheel (standard disc wheel) for emergency running system with integrated support ring

1. Hump 2 of standard disc wheel



<u>Fig. 40: H2 Disc Wheel For Emergency Running System With Integrated Support Ring</u> Courtesy of BMW OF NORTH AMERICA, INC.

EH2 disc wheel for emergency running system with self-supporting tire

- 1. Extended Hump 2 of disc wheel
- 2. Drop center relocated a few millimetres to the center (precentring on outside)

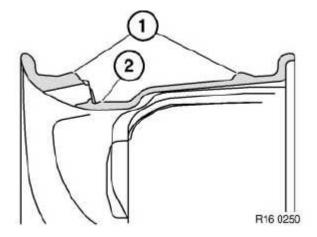


Fig. 41: EH2 Disc Wheel For Emergency Running System With Self-Supporting Tyre Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The new EH2 disc wheels (extended Hump 2 inner and outer) will be used more frequently on BMW vehicles in the future as they can also help to delay standard tires from being lost in the event of a drop in tire pressure.

Example: from current 1.1 bar to 0.6 bar (X5 or Landrover disc wheel)

Emergency running system with integrated support ring

(In the future, primarily on heavy safety vehicles)

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The support ring is made of a high-strength resilient plastic and is fitted on the disc wheel inside the tire. The support ring can only be removed using special tools which have been specially approved by BMW. It can only be removed after destroying the tire.

Emergency running systems with integrated support ring are used in particular on heavy safety vehicles. They allow the vehicle to be driven away from a potential danger without dropping speed even if the tires have suffered a complete loss of pressure (flight situation).

It is possible as an option to have the tire pressure monitored by an RDC system. The RDC is installed by pressing the components into the support ring before it is fitted.

Wheel structure with integrated support ring

Emergency running system with integrated support ring

- 1. Tyre
- 2. Support ring

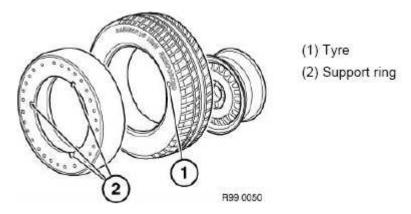
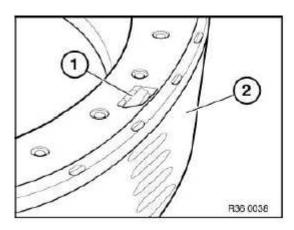


Fig. 42: Emergency Running System With Integrated Support Ring Courtesy of BMW OF NORTH AMERICA, INC.

Installation location of RDC wheel electronic unit

- 1. Wheel electronic unit
- 2. Support ring

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- Wheel electronic unit
- (2) Support ring

<u>Fig. 43: RDC Wheel Electronic Unit Installation Location</u> Courtesy of BMW OF NORTH AMERICA, INC.

For further information on the subject of "Tyre pressure warning systems and tires with emergency running characteristics", please refer to the vehicle Owner's Handbook.

A Parts Information bulletin will be published with information on how to order parts.

Functional and system descriptions are not subject to change. Parts availability and immediate ordering availability cannot be derived from this information. The specialized departments will inform the markets with further details at the appropriate time.

STORING WHEELS AND TIRES

all models

Wheels / tires-general notes

The service of storing a customer's wheels is one which is now almost taken for granted. For this reason, we have published this BMW Technical Service bulletin to provide a uniform storage concept, which will prevent damage being caused due to incorrect storage.

The tire's rubber will age under the influence of sunlight, heat, humidity, movements in the air and ozone, and will thus lose some of its stability and elasticity. For this reason, tires should never be stored in the open-air. If open-air storage cannot be avoided, the wheels / tires must be stored in a clean and dry condition and covered with waterproof material. It is essential that wheels / tires are protected against rain, snow and sunlight, but due to the risk of corrosion they must not be stored in tire sacks. For more information on protective covers for wheels and tires.

Wheels / tires with tire pressure control (RDC) must not be cleaned with high-pressure cleaning equipment. For general information on RDC.

Storage requirements

The following requirements apply in general to storage in enclosed rooms:

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STORAGE REQUIREMENTS

cool	1525 °C / sources of heat screened, or 1 m minimum distance from source of heat
dry	Prevent water and condensation Avoid contact with mineral lubrication products
dark	Protect from direct sunlight and high-UV artificial light
moderate ventilation	Avoid a supply of oxygen and ozone

In short, the storage room should be cool and dry. It is not necessary to heat the room during the winter. In the summer, the doors and windows should be kept closed to ensure that no air can circulate. In addition, the windows can also be coated with sun protection paint.

The storage room should not contain any working electric machinery, welding equipment, distribution boxes etc. as electrical sparks generate ozone which can have a serious impact on the surface of the tire (ozone cracks).

Tires should not be allowed to come into contact with oil, petrol, or other mineral lubricants as these dissolve rubber, making the tire porous.

Preparing wheels / tires

- 1. Before removing a wheel, mark its position on the vehicle.
- 2. Whenever possible, keep the tire on its wheel (complete wheels).
- 3. Correct the inflation pressure and recheck every 2 months.
- 4. Ensure that tires are stored at a sufficient distance above the ground. Wheels / tires should never be stored on the ground.
- 5. Complete the storage forms. These should contain the following data:
- Type and size of tire
- o Condition and tread depth
- Customer's address
- Date and signature of customer

Wheel / tire storage requirements

A. Tyre fitted to wheel

Do not store upright, ...

NOTE: If storing the wheels upright cannot be avoided, the inflation pressure must be increased to 3.5 bar.

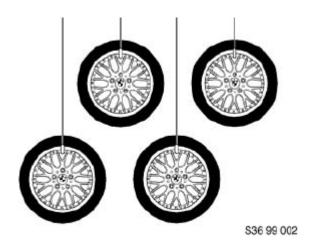
2007 SUSPENSION Wheel and tires - SI Techniques - Cooper



\$36.99.001

<u>Fig. 44: Precaution For Storing Wheels And Tires - Do Not Store Upright</u> Courtesy of BMW OF NORTH AMERICA, INC.

B. ... but rather hang ...

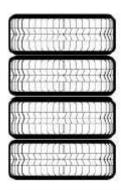


<u>Fig. 45: Precaution For Storing Wheels And Tires - Rather Hang</u> Courtesy of BMW OF NORTH AMERICA, INC.

... or stack.

NOTE: Never store tires on the ground. Use a wooden palette or similar.

2007 SUSPENSION Wheel and tires - SI Techniques - Cooper

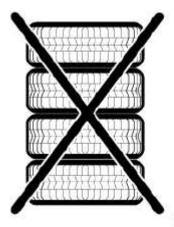


S36.99 003

<u>Fig. 46: Precaution For Storing Wheels And Tires - Stack</u> Courtesy of BMW OF NORTH AMERICA, INC.

C. Tires not fitted

Do not stack, ...

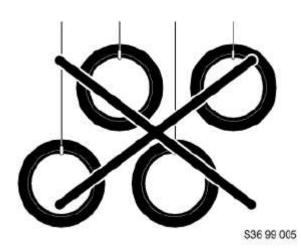


S36 99 004

<u>Fig. 47: Precaution For Storing Wheels And Tires - Do Not Stack</u> Courtesy of BMW OF NORTH AMERICA, INC.

... do not hang, ...

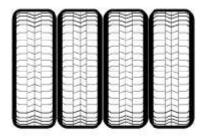
2007 SUSPENSION Wheel and tires - SI Techniques - Cooper



<u>Fig. 48: Precaution For Storing Wheels And Tires - Do Not Hang</u> Courtesy of BMW OF NORTH AMERICA, INC.

... but rather store them upright and turn them every 4 weeks.

NOTE: Never store tires on the ground.
Use commercially available shelves.



S36 99 006

<u>Fig. 49: Precaution For Storing Wheels And Tires - Store Upright</u> Courtesy of BMW OF NORTH AMERICA, INC.

SPECIAL CAUTIONS

WELDING

Before initiating any repair involving the use of an electric welder, the ignition must be in the off position and battery disconnected.

SUSPENSION FASTENERS

Manufacturer advises that some new fasteners must be used whenever old fasteners are loosened or removed.

SUPPLEMENTAL RESTRAINT SYSTEM

Refer to Procedure Explanation 29 for Supplemental Restraint/Air Bag Special Cautions.

ELECTRICAL COMPONENTS

Manufacturer advises that battery leads should not be disconnected while engine is running. Negative (-) terminal should be disconnected and isolated prior to any electrical repair, welding or charging of battery.

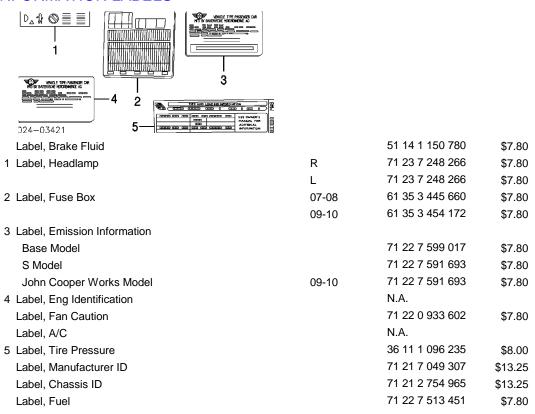
PAINT CODE LOCATION

Paint code is located on the left-hand front door jamb.

CLEAR COAT IDENTIFICATION

All colors are clear coat.

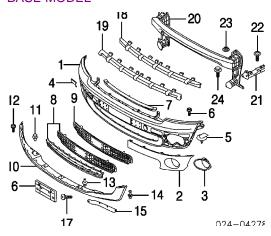
INFORMATION LABELS



FRONT BUMPER

Procedures 1 and 28

BASE MODEL



Refinish Front Bumper Cover		2.0
Refinish Outer Cover	R	1.0
	L	1.0
Refinish Center Air Deflector		1.0
Refinish Tow Hook Cover		.2
Refinish Object Sensor		.2
R&I Front Bumper Cover		1.6
O/H Bumper Cover Assy (Includes R&I)		3.0

Add to R&R or O/H Front Cover Assy

w/Fog Lamps	.4
w/Driving Lamps	.4
w/Ambient Sensor	.2
w/Object Sensors	.4

NOTE: All Parts in this section are included in overhaul unless noted otherwise.

1 Cover, Front Bumper (P)			
w/Aero Pkg		3.0 51 11 7 199 856	\$269.17
w/o Aero Pkg		3.0 51 11 2 753 995	\$269.17
2 Cover, Outer (P)			
w/Aero Pkg	R	.4 51 11 7 199 872	\$29.96
	L	.4 51 11 7 199 871	\$29.96
w/o Aero Pkg	R	.4 51 11 2 753 998	\$60.25
	L	.4 51 11 2 753 997	\$60.25
(P) Paint to Match			

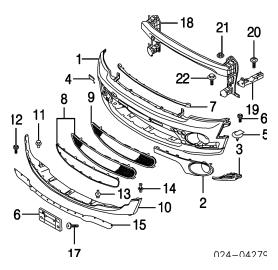
3	Bezel, Fog Lamp	R		51 11 2 753 662	\$24.95
		L		51 11 2 753 661	\$24.95
4	Cover, Tow Hook				
	w/Aero Pkg	R		.1 51 11 7 199 873	\$8.18
	w/o Aero Pkg (P)	R		.1 51 11 2 753 996	\$8.82
	(P) Paint to Match				
5	Clip, Retainer	R		07 13 2 757 821	\$0.77
		L		07 13 2 757 821	\$0.77
	Screw, Mounting (14)			51 64 2 752 568	\$0.89
7	Moulding, Panel			.2 51 11 2 751 623	\$28.51
	Grille, Air Intake				
8	w/Chrome Trim		#.3	51 11 2 755 463	\$63.57
9	w/o Chrome Trim				
	w/Aero Pkg		#.3	51 11 7 188 607	\$63.57
	w/o Aero Pkg		#.3	51 11 2 751 285	\$63.57
10	Deflector, Front Center Air (P)				
	w/Aero Pkg		#.3	51 11 7 188 608	\$73.57
	w/o Aero Pkg		#.3	51 11 2 756 495	\$83.68
	(P) Paint to Match				
	#w/Bumper Cover Removed				
11	Rivet, Mounting (4)			07 13 0 702 966	\$0.51
	Screw, Deflector (4)			51 64 2 752 568	\$0.89
	Plug, Bumper Cover (10)			51 47 1 911 992	\$0.42
	Rivet, Mounting	R		51 48 1 915 964	\$0.43
	,	L		51 48 1 915 964	\$0.43
15	Deflector, Front Outer Air				
	w/Aero Pkg	R		51 11 7 188 610	\$13.14
		L		51 11 7 188 609	\$13.14
	w/o Aero Pkg	R		51 11 2 755 334	\$10.02
		L		51 11 2 755 333	\$10.02
16	Bracket, License			.2 51 13 2 756 509	\$28.21
17	Screw, Mounting (2/Side)	R		07 14 2 756 133	\$0.27
		L		07 14 2 756 133	\$0.27
18	Absorber, Upper Impact		IOH	51 11 2 755 706	\$28.38
19	Absorber, Lower Impact		IOH	51 11 2 755 708	\$27.68
20	Support, Bumper		#.4	51 11 7 147 914	\$311.00
	#w/Bumper Cover Removed, Not Included in O/H				
21	Bracket, Support	R	#.2	31 10 6 772 232	\$36.92
	,	L	#.2	31 10 6 772 231	\$36.92
	World December 2011				
	#w/Bumper Support Removed, Not Included in O/H				

#w/Bumper Support Removed, Not Included in O/H

22	Screw, Mounting (2/Side)	R		51 64 2 756 146	\$0.79
		L		51 64 2 756 146	\$0.79
23	Nut, Retaining (3/Side)	R		07 14 7 139 131	\$1.98
		L		07 14 7 139 131	\$1.98
24	Bolt, Mounting (2/Side)	R		07 14 7 111 389	\$1.09
		L		07 14 7 111 389	\$1.09
	Sensor, Front Object (2/Side)				
	Black	R	#.1	66 20 6 934 308	\$136.04
		L	#.1	66 20 6 934 308	\$136.04
	Paint to Match	R	#.1	66 20 0 393 938	\$211.19
		L	#.1	66 20 0 393 938	\$211.19
	#w/Bumper Cover Removed, Not Included in O/H				
	Sensor, Ambient		#.2	65 81 6 905 133	\$48.51
	Retainer, Sensor		#.2	61 13 8 365 340	\$3.15

#R&R Complete, Not Included in O/H

S MODEL, JOHN COOPER WORKS MODEL



Refinish Front Bumper Cover		2.0
Refinish Outer Cover	R L	1.0 1.0
Refinish Center Air Deflector		1.0
Refinish Tow Hook Cover Refinish Object Sensor R&I Front Bumper Cover		.2 .2 1.6

12 Screw, Deflector (4)

	O/H Bumper Cover Assy (Includes R&I)		3.0		
	Add to R&R Front Cover or O/H Bumper Assy				
	w/Fog Lamps		.4		
	w/Driving Lamps		.4		
	w/Ambient Sensor		.2		
	w/Object Sensors		.4		
	NOTE: All Parts in this section are included in or	erhaul unless noted	d otherwi	se.	
1	Cover, Front Bumper (P)				
	w/Aero Pkg		3.0	51 11 7 199 869	\$269.17
	w/o Aero Pkg		3.0	51 11 2 754 003	\$269.17
2	Cover, Outer (P)				
	w/Aero Pkg	R	.4	51 11 7 199 872	\$29.96
		L	.4	51 11 7 199 871	\$29.96
	w/o Aero Pkg	R	.4	51 11 2 754 006	\$60.25
		L	.4	51 11 2 754 005	\$60.25
	(P) Paint to Match				
3	Insert, Cover	R	.2	51 11 7 188 606	\$21.20
		L	.2	51 11 7 188 605	\$21.20
4	Cover, Tow Hook				
	w/Aero Pkg (P)	R	.1	51 11 7 199 873	\$8.18
	w/o Aero Pkg	R	.1	51 11 2 754 004	\$8.02
	(P) Paint to Match				
5	Clip, Retainer	R		07 13 2 757 821	\$0.77
		L		07 13 2 757 821	\$0.77
6	Screw, Mounting (10)			51 64 2 752 568	\$0.89
	Moulding, Panel				
	w/Aero Pkg		.2	51 11 7 195 418	\$34.30
	w/o Aero Pkg		.2	51 11 7 209 904	\$26.31
	Grille, Air Intake				4 =0.0
8		#	.3	51 11 2 755 465	\$63.57
9	w/o Chrome Trim				******
	w/Aero Pkg	#	.3	51 11 7 188 607	\$63.57
	w/o Aero Pkg			51 11 2 751 286	\$63.57
10	Deflector, Front Center Air (P)	<i>"</i>			Ψοσ.σ.
-	w/Aero Pkg	ш	.3	51 11 7 188 608	¢72 57
	_		-	51 11 2 756 497	\$73.57
	w/o Aero Pkg	#	.3	J1 11 2 130 431	\$83.68
	(P) Paint to Match				
	#w/Bumper Cover Removed				
11	Rivet, Mounting (4)			07 13 0 702 966	\$0.51
	0 5 0 1 10			E4 C4 O 7EO ECO	40.00

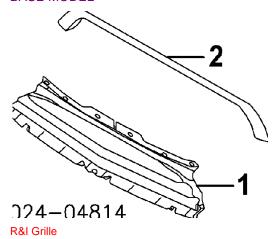
51 64 2 752 568

\$0.89

13 Plug, Bumper Cover (10)			51 47 1 911 992	\$0.42
14 Rivet, Mounting	R		51 48 1 915 964	\$0.43
	L		51 48 1 915 964	\$0.43
15 Retainer, Deflector			.2 51 11 2 755 337	\$37.90
16 Bracket, License			.2 51 13 2 756 510	\$28.21
17 Screw, Mounting (2/Side)	R		07 14 2 756 133	\$0.27
	L,		07 14 2 756 133	\$0.27
18 Support, Bumper		#.4	51 11 7 147 914	\$311.00
#w/Bumper Cover Removed, Not Include	d in O/H			
19 Bracket, Support	R	#.2	31 10 6 772 232	\$36.92
	L	#.2	31 10 6 772 231	\$36.92
#w/Bumper Support Removed, Not Include	ded in O/H			
20 Screw, Mounting (2/Side)	R		51 64 2 756 146	\$0.79
	L		51 64 2 756 146	\$0.79
21 Nut, Retaining (3/Side)	R		07 14 7 139 131	\$1.98
	L		07 14 7 139 131	\$1.98
22 Bolt, Mounting (2/Side)	R		07 14 7 111 389	\$1.09
	L		07 14 7 111 389	\$1.09
Sensor, Front Object (2/Side)				
Black	R	#.1	66 20 6 934 308	\$136.04
	L	#.1	66 20 6 934 308	\$136.04
Paint to Match	R	#.1	66 20 0 393 938	\$211.19
	L	#.1	66 20 0 393 938	\$211.19
#w/Bumper Cover Removed, Not Include	d in O/H			
Sensor, Ambient		#.2	65 81 6 905 133	\$48.51
Retainer, Sensor		#.2	61 13 8 365 340	\$3.15
#R&R Complete				

GRILLE

BASE MODEL



#Includes R&I/R&R Front Bumper Moulding Panel

1 Grille

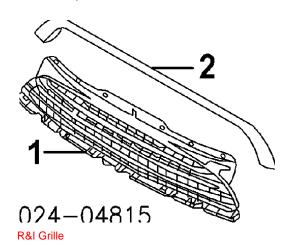
w/Aero Pkg	#.4	51 11 7 046 363	\$84.79
w/o Aero Pkg	#.4	51 11 2 752 363	\$218.63

#.4

#Includes R&I/R&R Front Bumper Moulding Panel

2 Moulding, Hood-See Hood Section

S MODEL, JOHN COOPER WORKS MODEL



#Includes R&I/R&R Front Bumper Moulding Panel

1 Grille

#.4

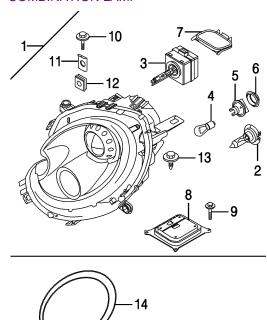
w/Aero Pkg	#.4	51 11 7 188 624	\$84.79
w/o Aero Pkg	#.4	51 13 7 209 903	\$84.79

#Includes R&I/R&R Front Bumper Moulding Panel

2 Moulding, Hood-See Hood Section

FRONT LAMPS

COMBINATION LAMP



	024-0428	
Aim Lamps		
R&I Combination Lamp Assy		R

NOTE: R&R Does Not include aim lamps.

Tro TET Trans 2000 From Include all Francisco				
1 Lamp Assy, Combination				
w/Auto Adjust H/Lamps				
Halogen	R		.3 63 12 2 751 876	\$299.31
	L		.3 63 12 2 751 875	\$299.31
Xenon	R		.3 63 12 2 754 794	\$588.66
	L		.3 63 12 2 754 793	\$588.66
w/o Auto Adjust H/Lamps				
Halogen	R		.3 63 12 2 751 870	\$284.24
	L		.3 63 12 2 751 869	\$284.24
Xenon	R		.3 63 12 2 754 792	\$559.00
	L		.3 63 12 2 754 791	\$559.00
Bulb, Headlamp¶				
2 Halogen	R	#.2	63 21 7 190 591	\$49.98
	L	#.2	63 21 7 190 591	\$49.98
3 Xenon	R	#.2	63 21 7 217 509	\$217.84
	L	#.2	63 21 7 217 509	\$217.84
4 Bulb, Turn Signal¶				

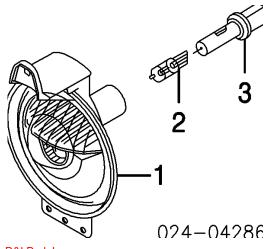
.4

.3

	w/Auto Adjust H/Lamps		R	#.2	63 21 7 160 897	\$19.96
	, ,		L	#.2	63 21 7 160 897	\$19.96
	w/o Auto Adjust H/Lamps		R	#.2	63 21 7 160 790	\$2.42
			L	#.2	63 21 7 160 790	\$2.42
	#R&R One Side Complete					
5	Socket, Bulb¶					
	w/Auto Adjust H/Lamps		R		63 21 7 160 795	\$11.20
			L		63 21 7 160 795	\$11.20
	w/o Auto Adjust H/Lamps		R		63 12 2 754 795	\$14.20
_	One Dullett		L		63 12 2 754 795	\$14.20
6	Cap, Bulb¶		R L		63 12 2 751 835 63 12 2 751 835	\$8.43
7	Cover Pulle		R		63 12 6 934 753	\$8.43
,	Cover, Bulb¶		L		63 12 6 934 753	\$13.37 \$13.37
8	Module, Headlamp Control¶		_		00 12 0 004 700	ψ13.37
Ŭ	Xenon					
	2007-09		R	#.1	63 11 7 182 520	\$471.20
			L	#.1	63 11 7 182 520	\$471.20
		2010				
	To 9-09		R	#.1	63 11 7 182 520	\$471.20
			L	#.1	63 11 7 182 520	\$471.20
	From 9-09		R	#.1	63 12 7 255 724	\$471.20
			L	#.1	63 12 7 255 724	\$471.20
	#w/Combination Lamp Assy Removed					
9	Screw, Mounting (3/Side)¶		R		63 12 2 754 796	\$2.51
9	Screw, Mounting (3/Side)¶		R L		63 12 2 754 796 63 12 2 754 796	\$2.51 \$2.51
	Screw, Mounting (3/Side)¶ Bolt, Mounting (3/Side)¶					
			L		63 12 2 754 796	\$2.51
10			L R		63 12 2 754 796 51 11 2 754 175	\$2.51 \$1.82
10	Bolt, Mounting (3/Side)¶		L R L		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175	\$2.51 \$1.82 \$1.82
10 11	Bolt, Mounting (3/Side)¶		L R L R		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225	\$2.51 \$1.82 \$1.82 \$0.47
10 11	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶		L R L R L		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 225	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47
10 11 12	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶		L R L R L		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 225 63 12 2 752 224	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47
10 11 12	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶ Fastener, Mounting (3/Side)¶		L R L R L		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 225 63 12 2 752 224 63 12 2 752 224	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47 \$2.05
10 11 12	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶ Fastener, Mounting (3/Side)¶		L R L R L R		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 225 63 12 2 752 224 63 12 2 752 224 63 12 2 755 050	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47 \$2.05 \$2.05 \$1.65
10 11 12	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶ Fastener, Mounting (3/Side)¶ Screw & Washer, Mtg¶ ¶Included w/Combination Lamp Assy		L R L R L R		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 225 63 12 2 752 224 63 12 2 752 224 63 12 2 755 050	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47 \$2.05 \$2.05 \$1.65 \$1.65
10 11 12	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶ Fastener, Mounting (3/Side)¶ Screw & Washer, Mtg¶		L R L R L R L		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 225 63 12 2 752 224 63 12 2 752 224 63 12 2 755 050 63 12 2 755 050	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47 \$2.05 \$2.05 \$1.65
10 11 12 13	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶ Fastener, Mounting (3/Side)¶ Screw & Washer, Mtg¶ ¶Included w/Combination Lamp Assy		L R L R L R	#.2	63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 225 63 12 2 752 224 63 12 2 752 224 63 12 2 755 050 63 12 2 755 050	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47 \$2.05 \$1.65 \$1.65
10 11 12 13	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶ Fastener, Mounting (3/Side)¶ Screw & Washer, Mtg¶ ¶Included w/Combination Lamp Assy Cover, Headlamp Washer		L R L R L R L	#.2 #.2	63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 224 63 12 2 752 224 63 12 2 752 224 63 12 2 755 050 63 12 2 755 050 61 67 2 752 559	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47 \$2.05 \$1.65 \$1.65
10 11 12 13	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶ Fastener, Mounting (3/Side)¶ Screw & Washer, Mtg¶ ¶Included w/Combination Lamp Assy Cover, Headlamp Washer		L R L R L R L		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 224 63 12 2 752 224 63 12 2 752 050 63 12 2 755 050 61 67 2 752 559 51 13 7 149 906	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47 \$2.05 \$1.65 \$1.65 \$7.18 \$7.18 \$24.17
10 11 12 13	Bolt, Mounting (3/Side)¶ Clip, Mounting (3/Side)¶ Fastener, Mounting (3/Side)¶ Screw & Washer, Mtg¶ ¶Included w/Combination Lamp Assy Cover, Headlamp Washer Bezel, Headlamp		L R L R L R L		63 12 2 754 796 51 11 2 754 175 51 11 2 754 175 63 12 2 752 225 63 12 2 752 224 63 12 2 752 224 63 12 2 752 050 63 12 2 755 050 61 67 2 752 559 51 13 7 149 906	\$2.51 \$1.82 \$1.82 \$0.47 \$0.47 \$2.05 \$1.65 \$1.65 \$7.18 \$7.18 \$24.17

PARK LAMP

L 61 11 6 965 945 \$323.18 (a) Order by Application **HEADLAMP WASHER** 024-04283 61 67 2 752 972 1 Nozzle, H/Lamp Washer #.2 \$13.50 #.2 61 67 2 752 971 \$13.50 #w/Combination Lamp Assy Removed 2 Reservoir, Washer-See Windshield Section 3 Cap, Reservoir-See Windshield Section Pump, H/Lamp Washer 61 67 2 751 744 \$54.75 4 Pump, Windshield Washer-See Windshield Section 5 Sensor, Level-See Windshield Section 61 66 2 753 972 6 Hose, Washer¶ \$40.72 ¶Cut to Fit 61 66 7 160 000 7 Clamp, Hose \$1.05 8 Screw, Mtg-See Windshield Section

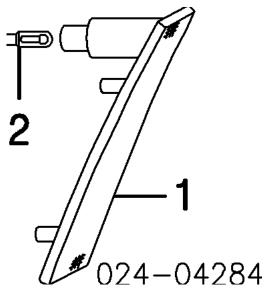


R&I Park Lamp R #.2 L #.2

#Included in R&R Front Cover or O/H Bumper Assy

1 Lamp, Park	R	#.2	51 11 2 751 293	\$50.50
	L	#.2	51 11 2 751 293	\$50.50
2 Bulb, Park Lamp	R	#.2	63 21 7 160 797	\$1.98
	L	#.2	63 21 7 160 797	\$1.98
#R&R One Side Complete, Included in R&R Front Cover Assy	or O/H	Bumper		
3 Socket, Bulb	R		63 12 8 380 205	\$7.23
	L		63 12 8 380 205	\$7.23

SIDE MARKER LAMP



R&I Side Marker Lamp

R #.2

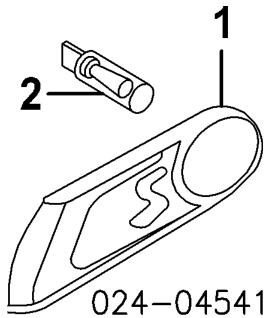
#.2

#Included in R&R Wheel Opening Moulding

1 Lamp, Side Marker	R	#.2	63 13 2 751 332	\$24.79
	L	#.2	63 13 2 751 331	\$24.79
2 Bulb, Side Marker Lamp	R	#.2	07 11 9 905 358	\$1.98
	L	#.2	07 11 9 905 358	\$1.98

#R&R One Side Complete, Included in R&R Wheel Opening Moulding

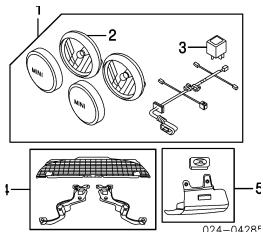
SIDE REPEATER LAMP



1 Lamp, Signal				
w/Aero Pkg	R	#.2	63 13 7 188 614	\$31.83
	L	#.2	63 13 7 188 613	\$31.83
w/o Aero Pkg				
Amber Lens	R	#.2	63 13 2 751 504	\$19.31
	L	#.2	63 13 2 751 503	\$19.31
Clear Lens				
Base Model	R	#.2	63 13 2 754 254	\$22.97
	L	#.2	63 13 2 754 253	\$22.97
S Model	R	#.2	63 13 2 751 970	\$27.31
	L	#.2	63 13 2 751 969	\$27.31
#Included in R&R Fender				
2 Bulb, Lamp	R	#.2	63 21 7 160 798	\$3.00
	L	#.2	63 21 7 160 798	\$3.00

#Included in R&R Signal Lamp

DRIVING LAMP



Aim Driving Lamp R&I Driving Lamp .3

63 12 0 417 669

#.3 #.3

R&R Driving Lamp

R #.3 L #.3

R

#Included in R&R or O/H Front Bumper Cover Assy, R&R Both Sides .4

1	Lam	ρŀ	≺it,	Dr	ivir	ıg

Dealer Installed

w/Aero Pkg Chrome Black

Black # 63 12 0 420 291

w/o Aero Pkg

Chrome # 63 21 0 420 292 \$292.00

Black # 63 12 0 417 885 \$292.00

#See Headnotes for Labor Time

2 Lamp, Driving¶

Dealer Installed R #.3 63 12 0 417 670 \$106.95 L #.3 63 12 0 417 670 \$106.95

#Included in R&R or O/H Front Bumper Cover Assy, R&R Both Sides .4

3 Module, Control¶

Dealer Installed 63 12 0 420 296 \$57.00

¶Included w/Driving Lamp Kit

4 Bracket & Grille, Lamp

Dealer Installed

w/Aero Pkg #.2 63 13 0 422 708 \$116.94

w/o Aero Pkg #.2 63 13 0 422 707 \$116.94

#Included in R&R Front Cover or O/H Bumper Assy

5 Switch & Pad, Lamp (a)
Dealer Installed 51 45 0 428 698 \$125.00

(a) Gray listed, Order by Application

FOG LAMP

Aim Lamps R&I Fog Lamp

" 0

R #.3 L #.3

#Included in R&R or O/H Front Bumper Cover Assy, R&R Both Sides .4

024-04287

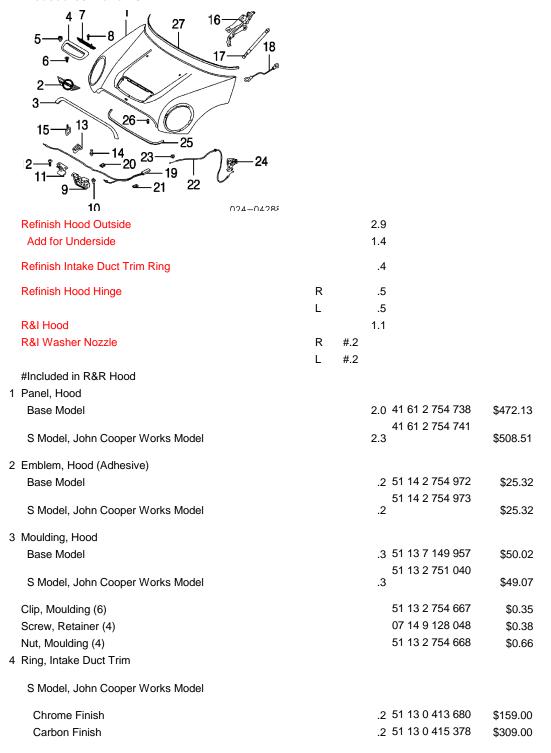
NOTE: R&R Does Not include aim lamps.

1	Lamp, Fog	R	#.3	63 17 2 751 295	\$118.28		
		L	#.3	63 17 2 751 295	\$118.28		
#Included in R&R or O/H Front Bumper Cover Assy, R&R Both Sides .4							
2	Cover, Access	R		63 17 2 755 724	\$7.93		
		L		63 17 2 755 723	\$7.93		
3	Bulb, Fog Lamp	R	#.2	07 11 9 906 503	\$36.20		
		L	#.2	07 11 9 906 503	\$36.20		
4	Bulb, Park Lamp	R	#.2	63 21 7 160 797	\$1.98		
		L	#.2	63 21 7 160 797	\$1.98		
	#R&R One Side Complete, Included in R&R Fog Lamp						
	Socket, Fog Lamp Bulb	R		61 13 8 373 332	\$2.83		
		L		61 13 8 373 332	\$2.83		
5	Socket, Park Lamp Bulb	R		63 12 8 380 205	\$7.23		
		L		63 12 8 380 205	\$7.23		
_	Porel For Laws Con Front Duranas Continu						

6 Bezel, Fog Lamp-See Front Bumper Section

HOOD

Procedures 4 and 28

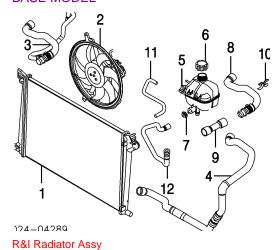


5	Paint to Match Clip, Retaining (6)			.2	51 13 2 757 694	\$98.23
	S Model, John Cooper Works Model				51 47 2 753 167	\$0.87
6	Screw, Retainer					
	S Model, John Cooper Works Model				41 00 2 753 672	\$0.46
7	Grille, Intake					
	S Model, John Cooper Works Model				51 23 2 752 275	\$24.99
8	Retainer (4)					
	S Model, John Cooper Works Model				N.A.	
9	Latch, Hood			.3	51 23 2 753 419	\$25.18
10	Screw, Latch (4)				07 14 6 985 055	\$0.42
11	Catch, Latch			.2	51 23 2 753 420	\$24.42
12	Screw (2)				07 14 7 142 046	\$0.73
13	Cover, Upper Hood Latch				51 23 7 002 012	\$4.49
14	Rivet, Plastic (2)				51 16 8 197 908	\$0.33
15	Bracket, Catch				51 23 7 008 756	\$6.30
16	Hinge, Hood	R	#.3		41 00 7 211 640	\$52.13
		L	#.3		41 00 7 211 639	\$52.13
	#w/Hood Removed					
	Bolt, Hinge (3/Side)	R			07 14 7 131 648	\$1.09
		L			07 14 7 131 648	\$1.09
17	Prop, Rod	R			51 23 7 148 864	\$36.67
		L			51 23 7 148 864	\$36.67
18	Strap, Ground				12 42 7 557 769	\$15.87
19	Cable, Front Release				51 23 2 751 378	\$16.58
20	Clip, Cable				51 64 2 753 381	\$1.30
21	Retainer, Protector				51 64 2 752 242	\$0.75
22	Cable, Rear Release				51 23 7 148 865	\$14.02
	Clamp, Cable				61 13 8 368 029	\$0.45
24	Handle, Cable Release				51 23 7 149 591	\$7.40
25	Seal, Front				51 71 2 751 261	\$11.46
26	Bumper, Hood	R			51 23 2 756 173	\$1.93
		L			51 23 2 756 173	\$1.93
27	Moulding, Rear					
	Base Model			.2	51 13 7 145 123	\$25.61
	S Model, John Cooper Works Model			.2	51 13 2 751 359	\$25.61

COOLING

Procedures 5 and 28

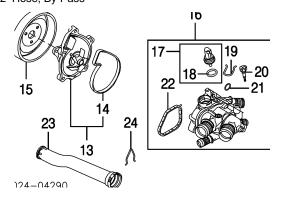
BASE MODEL



#.../F-----t O------ D------------------- D0 D

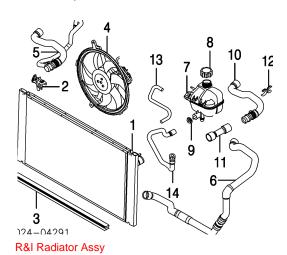
1 Radiator	#2.0	17 11 7 535 099	\$276.51
#w/Front Cover Removed, Includes R&R Fan			
2 Fan, Radiator	1.4	17 42 2 754 854	\$307.93
3 Hose, Upper Radiator	.7	17 12 2 754 222	\$45.48
4 Hose, Lower Radiator	1.3	17 12 2 754 247	\$57.03
5 Reservoir, Coolant	.7	17 13 7 539 267	\$52.55
6 Cap, Reservoir		17 13 2 754 264	\$9.53
7 Grommet, Tank		17 13 2 751 855	\$2.48
8 Hose, Radiator	.5	17 12 2 754 221	\$28.30
9 Tube, Connector		17 12 2 754 203	\$28.30
10 Clip, Hose		17 12 2 757 529	\$1.07
11 Hose, Overflow		17 12 2 754 219	\$22.85
12 Hose, By-Pass		17 12 2 754 573	\$28.30

#2.0



13	Pump Assy, Water	3.6	11 51 7 5	550 484	\$171.54
14	Gasket, Water Pump¶		11 51 7 5	552 836	\$7.25
	¶Included w/Water Pump Assy				
15	Pulley, Water Pump	2.3	11 51 7 5	71 012	\$33.63
	Belt, Drive	.6	11 28 7 5	66 789	\$30.70
16	Housing Assy, Thermostat	2.7	11 53 7 5	34 521	\$123.80
17	Sensor Assy, Temperature (a)	.5	13 62 7 5	535 068	\$17.13
18	Seal, Sensor (a) (b)		11 53 7 5	547 824	\$1.92
	(b) Included w/Temperature Sensor Assy				
19	(b) Included w/Temperature Sensor Assy Clamp, Housing (a)		11 53 7 5	547 825	\$1.91
			11 53 7 5 11 53 7 5		\$1.91 \$3.67
20	Clamp, Housing (a)			559 883	
20 21	Clamp, Housing (a) Screw, Bleeder (a)		11 53 7 5	559 883 548 657	\$3.67
20 21	Clamp, Housing (a) Screw, Bleeder (a) Seal, Housing (a)		11 53 7 5 11 53 7 5	559 883 548 657	\$3.67 \$1.92
20 21 22	Clamp, Housing (a) Screw, Bleeder (a) Seal, Housing (a) Gasket, Housing (a)	2.5	11 53 7 5 11 53 7 5	559 883 548 657 548 658	\$3.67 \$1.92
20 21 22 23	Clamp, Housing (a) Screw, Bleeder (a) Seal, Housing (a) Gasket, Housing (a) (a) Included w/Thermostat Housing Assy	2.5	11 53 7 5 11 53 7 5 11 53 7 5	559 883 548 657 548 658 589 713	\$3.67 \$1.92 \$5.00

S MODEL, JOHN COOPER WORKS MODEL



#w/Front Cover Removed, Includes R&R Fan

1	Radiator
1	Radiator

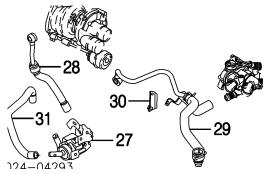
Man Trans	#2.0	17 11 2 751 275	\$276.51
Auto Trans	#2.0	17 11 2 751 276	\$276.51

#2.0

#w/Front Cover Removed, Includes R&R Fan

2 Bracket, Upper Radiator	R	17 11 2 751 342	\$3.70
	L	17 11 2 751 341	\$3.70
3 Seal, Lower Radiator		17 11 2 754 861	\$12.33
4 Fan, Radiator		1.4 17 42 2 752 632	\$354.12
5 Hose, Upper Radiator		.7 17 12 2 754 222	\$45.48
6 Hose, Lower Radiator		1.3 17 12 2 754 223	\$57.03
7 Reservoir, Coolant		.7 17 13 7 539 267	\$52.55
8 Cap, Reservoir		17 13 2 754 264	\$9.53
9 Grommet, Tank		17 13 2 751 855	\$2.48
10 Hose, Radiator		.5 17 12 2 754 221	\$28.30
11 Tube, Connector		17 12 2 754 224	\$28.30
12 Clip, Hose		17 12 2 757 529	\$1.07
13 Hose, Overflow		17 12 2 754 231	\$22.85
14 Hose, By-Pass		17 12 2 754 573	\$28.30
17 16 25 15 16 26 17 18 19 21 22 24 20 21 22 24 20 21 22 24 20 21 22 21 22			
15 Pump Assy, Water		3.6 11 51 7 550 484	\$171.54
16 Gasket, Water Pump¶		11 51 7 552 836	\$7.25
To Cache, Trains I amp			ψ=0
¶Included w/Water Pump Assy			
17 Pulley, Water Pump		1.5 11 51 7 571 012	\$33.63
Belt, Drive		.6 11 28 7 566 789	\$30.70
18 Housing Assy, Thermostat		2.7 11 53 7 534 521	\$123.80
		13 62 7 535 068	
19 Sensor Assy, Temperature (a)		.5	\$17.13
20 Seal, Sensor (a) (b)		11 53 7 547 824	\$1.92
(b) Included w/Temperature Sensor Assy			
21 Clamp, Housing (a)		11 53 7 547 825	\$1.91
22 Screw, Bleeder (a)		11 53 7 559 883	\$3.67
23 Seal, Housing (a)		11 53 7 548 657	\$1.92
24 Gasket, Housing (a)		11 53 7 548 658	\$5.00
(a) Included w/Thermostat Housing Assy		55 / 5 / 5 / 5 / 5	ψ0.00
(a) moluded w/ Memiosial Housing Assy			

26 Clip, Retainer 11 53 7 548 652 \$1.91



				50 7 0	00.070	
27	Pump, Auxiliary Water	•	1.6 11	53 / 6	03 976	\$136.70
28	Hose, Turbo Cooler Feed	#1.1	11	53 7 5	65 433	\$25.05
29	Hose, Turbo Cooler Return	#1.4	11	53 7 5	67 849	\$57.35
	#R&R Both 2.0					
30	Bracket, Hose		11	53 7 5	68 433	\$18.57
31	Hose, By-Pass		.8 11	53 7 5	65 432	\$15.40
	R&I Radiator Assy	#2.0				

#w/Front Cover Removed, Includes R&R Fan

#w/Front Cover Removed, Includes R&R Fan

#R&R Both 2.0

A/C REFRIGERANT CAPACITIES

A/C R-134a Refrigerant Capacity

14.0-15.0 Ozs (0.89-0.93 Lbs), 397-425 g

A/C HEATER/VENTILATION

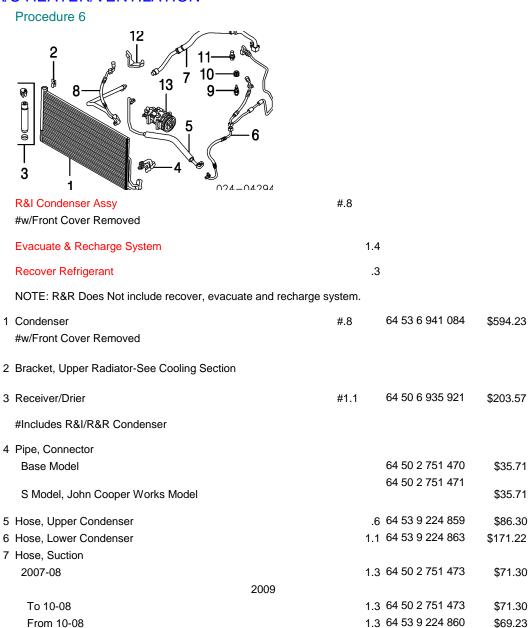
8 Hose, Discharge 2007-09

To 3-10

9 Valve (2)

10 Cap (2)

From 3-10



2010

2010

1.3 64 53 9 224 860

.8 64 50 2 751 474

.8 64 53 9 224 857

.8 64 53 9 230 694

64 53 6 922 944

64 53 8 387 438

\$69.23

\$71.30

\$69.23

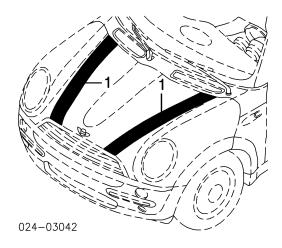
\$3.70

\$0.88

	Sensor, Pressure			.5	64 53 9 181 464	\$55.32
	Bracket, Pipe				64 50 2 752 623	\$4.89
13	Compressor		07-0		64 52 2 758 145	\$945.83
	B 1 4 6		09-1	2.4	64 52 2 758 433	\$945.83
	Bracket, Compressor				64 55 7 580 781	\$48.43
	Belt, Drive-See Cooling Section					
	24 20 27 31 24 21 15 30 21 14 16 30 23 22 18 17	29				
	024_	-N420F				
14	Case, Blower					
	w/ATC		#3.2		64 11 3 448 072	\$699.63
	w/o ATC		#3.2	<u>-</u>	64 11 3 448 070	\$699.63
	Gasket Set, Case				64 11 3 422 671	\$19.38
16	Cover, Case				64 11 3 422 670	\$35.32
17	Evaporator		#3.7	,	64 11 3 422 669	\$461.98
	#w/Instrument Panel Removed					
18	Valve, Expansion			1.8	64 50 3 452 759	\$152.98
19	Blower, A/C					
	w/ATC		#2.0)	64 11 3 422 644	\$127.07
	w/o ATC		#2.0)	64 11 3 422 646	\$127.07
	#w/Instrument Panel Removed					
20	Actuator, Fresh Air				64 11 3 422 659	\$67.90
	Actuator, Air Distribution				64 11 3 422 658	\$46.10
	Resistor, Blower			1 0	64 11 3 422 663	\$40.75
	Regulator, Blower			1.0	01110122000	ψ+0.75
23	Regulator, blower	2007			64 11 3 422 662	\$101.47
		2007			5. 11 5 TZZ 55Z	ψ101.47
	To 7-08	2000			64 11 3 422 662	\$101.47
	From 7-08				64 11 3 453 935	\$101.47
	2009-10				64 11 3 453 935	\$101.47
24	Sensor, Temperature				64 11 9 116 269	\$33.45
	Sensor, Heater Temp				64 11 3 422 660	\$33.45
	Harness, A/C /Heater					
	w/ATC				64 11 3 422 706	\$97.17

w/o ATC		64 11 3 422 711	\$97.17
27 Case, Filter		64 11 3 422 674	\$88.00
28 Filter, Micro		.6 64 31 9 127 515	\$36.69
Cover, Filter		64 31 9 127 516	\$47.89
29 Core, Heater	#2.2	64 11 3 422 666	\$160.72
#w/Instrument Panel Removed			
30 Pipe, Core		64 11 3 422 667	\$61.37
31 Mount, Clamp		64 11 3 422 668	\$12.01
32 Cover, Side		64 11 3 422 672	\$31.38

STRIPE TAPE

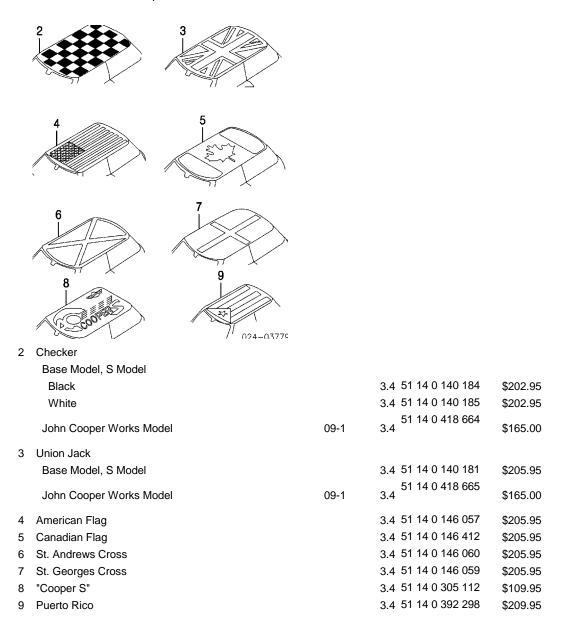


NOTE: Time is for installation only.

1	Stripe,	Hood
---	---------	------

Olipo, Hood			
Black	07-0 R	.6 51 14 2 755 606	\$55.00
	L	.6 51 14 2 755 605	\$55.00
	09-1 R	.6 51 14 2 755 610	\$55.00
	L	.6 51 14 2 755 609	\$55.00
White	07-0 R	.6 51 14 2 755 604	\$55.00
	L	.6 51 14 2 755 603	\$55.00
	09-1 R	.6 51 14 2 755 608	\$55.00
	L	.6 51 14 2 755 607	\$55.00

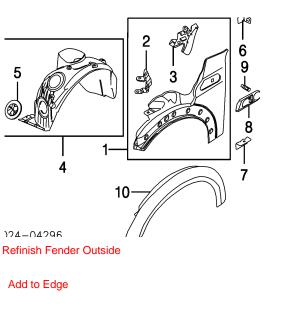
Decal, Roof



FRONT FENDER

Procedures 7 and 28

SHEET METAL/EXTERIOR TRIM



Add to Edge	R L		.5 .5
Refinish Wheel Opening Moulding	R		.8
	L		.8
R&I Fender	R	#1.1	
	L	#1.1	

#Includes R&I/R&R Wheel Opening Moulding & Front Fender Liner

R&I Wheel Opening Moulding	R	.3		
1 Fender Assy	L R L	.3 #1.6 #1.6	41 35 2 754 726 41 35 2 754 725	\$209.98 \$209.98
#Includes R&I/R&R Wheel Opening Moulding & Front Fe Liner	ender			
2 Bracket, Side¶	R	#.2	41 35 2 754 724	\$12.13
	L	#.2	41 35 2 754 723	\$12.13
#w/Fender Removed				
3 Plate, Cover¶	R		41 35 2 754 720	\$16.52
	L		41 35 2 754 719	\$16.52
¶Included w/Fender Assy				
4 Liner Assy, Fender	R	.4	51 71 7 207 578	\$74.52

R

L

2.0

2.0

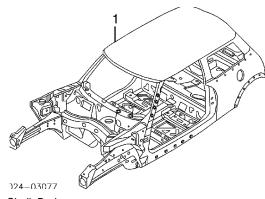
		L	.4 51 71 7 207 577	\$74.52
5	Cover, Liner (2/Side) (a)	R	51 77 2 751 776	\$4.47
		L	51 77 2 751 776	\$4.47
	(a) Included w/Fender Liner Assy			
6	Bracket, Upper	R	41 35 2 754 656	\$3.90
		L	41 35 2 754 656	\$3.90
7	Bracket, Lower	R	41 35 2 754 655	\$3.90
		L	41 35 2 754 655	\$3.90
8	Lamp, Signal-See Front Lamps Section			
	#Included in R&R Fender			
9	Bulb, Lamp-See Front Lamps Section			
	#Included in R&R Signal Lamp			
10	Moulding, Wheel Opening			
	2007-08	R	.3 51 77 2 751 318	\$63.18
		L	.3 51 77 2 751 317	\$63.18
	2009-10 (P)	R	.3 51 77 7 216 072	\$90.27
		L	.3 51 77 7 216 071	\$90.27
	(P) Paint to Match			
	Clip, Moulding (2/Side) (b)	R	51 41 8 176 418	\$0.23
		L	51 41 8 176 418	\$0.23
	(b) Non-Reusable Part			

UNDERHOOD DIMENSIONS

Information not available at time of publication.

BODY ASSY

Procedures 15 and 28



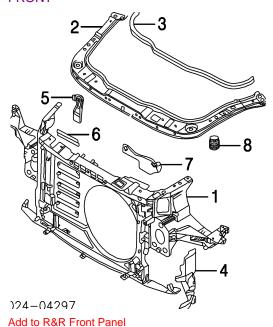
1 Shell, Body w/Sunroof w/o Sunroof

41 00 2 755 930 41 00 2 755 928

FRONT INNER STRUCTURE

Proced	ures 8	3 and	28

FRONT



To R&R Base Model Mechanical Components

#.8

#Includes R&I/R&R Condenser, Air Bag Sensors

Add to R&R Front Panel w/Turbo

#.6

#Includes R&I/R&R Intercooler

Add to R&R Front Panel w/Driving Lamps

#.3

.4

\$280.94

#Time is to Disassemble & Assemble Wiring Harness Connectors

To Aim Lamps

Evacuate & Recharge System 1.4

Recover Refrigerant .3

1 Panel, Front (Com)

Base Model #6.2 51 64 7 145 012 \$280.94

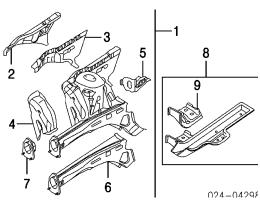
51 71 7 147 912 S Model, John Cooper Works Model #6.2

 $\hbox{\#Includes R\&I Front Bumper Cover, R\&I/R\&R Combination Lamps, Upper Panel, Radiator, Fan Assy, Grille, Hood Latch \& D\&C Hood Release Cable \& Wire Harness}$

2 Panel, Upper			
Base Model	#1	.5 51 71 2 751 260	\$185.46
		51 71 7 147 911	
S Model, John Cooper Works Model	#1	.5	\$185.46
#Includes R&I Combination Lamp Assy			
, ,			
3 Seal, Front-See Hood Section			
o deal, i forti dec filodi decilori			
4 Duct, Air	R	.2 51 64 2 751 282	\$32.43
	L	.2 51 64 2 751 281	\$32.43
5 Bracket, Front	R	51 11 2 755 451	\$3.84
	L	51 11 2 755 451	\$3.84
6 Cover, Panel (5)		51 64 2 751 397	\$8.73
7 Plate, Heat Shield			
,		51 64 2 751 339	
S Model, John Cooper Works Model			\$11.76

8 Bumper, Hood-See Hood Section

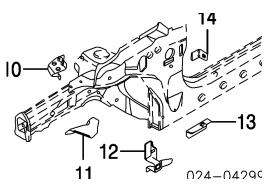
SIDE



•		11/4-114/98		
Refinish Wheelhouse Assy			R	1.6
			L	1.6
Refinish Side Rail Panel				
Outer			R	.5
			L	.5
Inner			R	.5
			L	.5
Refinish Front Support			R	.8
			L	.8
Refinish Side Rail Panel			R	1.0
			L	1.0

1 Wheelhouse Assy	R	11.0 41 00 2 755 186	\$448.97
•	L	11.0 41 00 2 755 185	\$448.97
Panel, Side Rail¶			•
2 Outer	R	3.0 41 00 2 755 062	\$54.71
	L	3.0 41 00 2 755 061	\$54.71
3 Inner	R	3.5 41 11 2 754 778	\$42.10
	L	3.5 41 11 2 754 777	\$42.10
4 Support, Front¶	R	2.5 41 00 2 755 190	\$22.05
	L	2.5 41 00 2 755 189	\$22.05
5 Support, Rear¶	R	41 11 2 754 772	\$12.35
	L	41 11 2 754 771	\$12.35
6 Panel, Side Rail¶	R	8.5 41 11 2 755 194	\$185.05
	L	8.5 41 11 2 755 193	\$185.05
7 Extension, Rail¶	R	1.0 41 11 2 754 636	\$12.62
	L	1.0 41 11 2 754 635	\$12.40
¶Included w/Wheelhouse Assy			
8 Support Assy, Lower	R	3.5 41 00 2 755 184	\$138.40
	L	3.5 41 00 2 755 183	\$138.40
9 Brace, Support (a)	R	41 11 2 754 682	\$28.92
	L	41 11 2 754 681	\$28.92

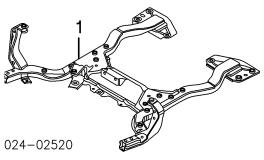
(a) Included w/Lower Support Assy



10 Bracket, Panel	R	1.0 41 11 2 754 770	\$6.63
	L	1.0 41 11 2 754 769	\$6.63
11 Bracket, Brake Pipe	R	.5 41 11 2 754 686	\$4.93
	L	.5 41 11 2 754 685	\$4.83
12 Support, Side	R	1.0 41 21 7 132 512	\$8.33
	L	1.0 41 21 7 132 511	\$8.33

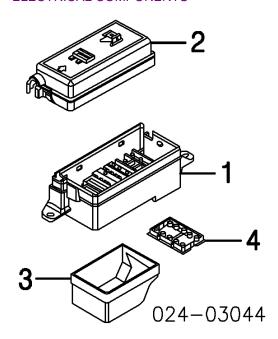
- 13 Bracket, Lower-See Front Fender Section
- 14 Bracket, Upper-See Front Fender Section

SUB-FRAME



1	Sub-Frame		5.5 31 11 6 772 229	\$599.51
	Bolt, Frt Sub-Frame	R	31 10 6 774 713	\$3.41
		L	31 10 6 774 713	\$3.41
	Bolt, Rear Sub-Frame (3/Side)	R	33 30 6 770 527	\$2.63
		L	33 30 6 770 527	\$2.63

ELECTRICAL COMPONENTS



	1	Box,	Fuse
--	---	------	------

	2007		
To 3-07		61 14 6 906 548	\$86.15
From 3-07		61 14 3 449 504	\$86.15
2008-10		61 14 3 449 504	\$86.15
2 Cover, Fuse Box			
	2007		
To 3-07		.1 61 14 6 906 628	\$5.75
From 3-07		.1 61 14 3 449 505	\$5.87

.1 61 14 3 449 505	\$5.87
.1 61 13 6 906 629	\$2.70
61 13 6 921 483	\$2.33
61 13 1 509 012	\$3.12
12 51 7 567 114	\$365.13
	.1 61 13 6 906 629 61 13 6 921 483 61 13 1 509 012

AIR BAG SYSTEM

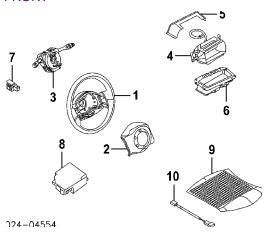
Procedure 30

NOTE 1: R&I/R&R Does Not include disable and enable or diagnose Air Bag System.

NOTE 2: Refer to Procedural Explanation 30 for Supplemental Restraint/Air Bag System Component Inspection and Replacement Information.

NOTE 3: For Air Bag System Service procedures, refer to Manufacturer's Service Repair Manual or Mitchell's Air Bag Service and Repair Manual.

FRONT



Disable & Enable Air Bag System

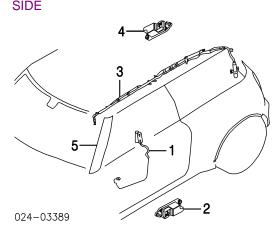
.3

1 Wheel, Steering-See Steering Wheel/Column Section

2 Module, Driver Air Bag3 Switch, Combination	.3 32 30 2 757 666	\$504.35
w/DSC		
w/Rain Sensor		
Halogen H/Lamps	1.2 61 31 3 451 891	\$438.00
Xenon H/Lamps	1.2 61 31 3 453 992	\$591.69
w/o Rain Sensor		
Halogen H/Lamps	1.2 61 31 3 451 900	\$438.00
Xenon H/Lamps	1.2 61 31 3 453 991	\$591.69
w/o DSC		
w/Rain Sensor		
Halogen H/Lamps	1.2 61 31 3 451 899	\$438.00
Xenon H/Lamps	1.2 61 31 3 451 902	\$82.95
w/o Rain Sensor	1.2 61 31 3 453 999	\$540.24

Clockspring-Serviced w/Combination Swi	tch
----------------------------------------	-----

4	Module, Passenger Air Bag			#.8	51 45 9 185 462	\$758.49
5	Cover, Passenger Air Bag Module			#.8	51 45 2 755 619	\$14.27
	#P&P Complete					
,	#R&R Complete				51 45 2 752 768	# 00.70
C	Support, Air Bag Module				31 43 2 732 700	\$62.70
	Pretensioner, Seat Belt-See Seat Belts Section					
7	Sensor, Front Impact					
	2007-08		R		5 65 77 6 964 608	\$65.03
			L		5 65 77 6 964 608	\$65.03
		2009				
	To 3-09		R		5 65 77 6 964 608	\$65.03
			L		5 65 77 6 964 608	\$65.03
	From 3-09		R		5 65 77 9 159 315	\$65.03
			L		5 65 77 9 159 315	\$65.03
		2010	R		5 65 77 9 159 315	\$65.03
			L		5 65 77 9 159 315	\$65.03
8	Control Unit, Air Bag			#1.3	65 77 3 454 346	\$480.82
	#w/Front Seat Assemblies, Center Console & F	Rear Seat A	Assy Re	emoved		
g	Sensor, Occupant Detector					
	Passenger Side			#.6	52 10 2 755 393	\$146.30
10	Sensor, Seat Position					
	Driver Side			#.3	52 10 2 752 671	\$41.47
	#w/Seat Assy Removed					
	SIDE					



Disable & Enable Air Bag System

.3

1 Module, Seat Air Bag Base Model, S Model

		L	#.6	52 10 9 170 691	\$209.61
John Cooper Works Model	09-	1 R	#.6	52 10 2 753 588	\$209.61
		L	#.6	52 10 2 753 587	\$209.61
#w/Front Seat Removed					
2 Sensor, Side Impact					
2007-08		R	#.5	65 77 9 118 167	\$65.03
		L	#.5	65 77 9 118 167	\$65.03
	2009				
To 3-09		R	#.5	65 77 9 118 167	\$65.03
		L	#.5	65 77 9 118 167	\$65.03
From 3-09		R	#.5	65 77 9 159 311	\$65.03
		L	#.5	65 77 9 159 311	\$65.03
	2010	R	#.5	65 77 9 159 311	\$65.03
		L	#.5	65 77 9 159 311	\$65.03
#w/Front Door Trim Panel Removed					
3 Module, Side Curtain Air Bag		R	#.9	72 12 7 134 078	\$325.47
		L	#.9	72 12 7 134 077	\$325.47
#w/Headliner Removed					
4 Sensor, Center Impact					
2007-08		R	#.3	65 77 6 977 398	\$65.03
		L	#.3	65 77 6 977 398	\$65.03
	2009				
To 3-09		R	#.3	65 77 6 977 398	\$65.03
		L	#.3	65 77 6 977 398	\$65.03
From 3-09		R	#.3	65 77 9 159 314	\$65.03
		L	#.3	65 77 9 159 314	\$65.03
	2010	R	#.3	65 77 9 159 314	\$65.03
		L	#.3	65 77 9 159 314	\$65.03

#w/Quarter Trim Panel Assy Removed

⁵ Garnish, Windshield Pillar-See Windshield Section

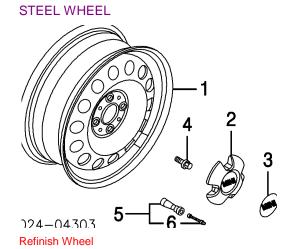
ABS/BRAKES

, · · ·	O/DIVINEO		
	Bleed System	.6	
	NOTE: R&I/R&R Does Not include bleed brake system.		
1	Hydraulic Unit, ABS¶		
	Base Model		
	w/DSC		
	w/ASC	1.6 34 50 6 78	36 225 \$1,839.65
	w/o ASC	1.6 34 51 6 79	90 383 \$2,237.77
	w/o DSC	1.6 34 50 6 78	36 224 \$1,801.87
	S Model, John Cooper Works Model		
	w/DSC	1.6 34 51 6 79	90 383 \$2,237.77
	w/o DSC	1.6 34 50 6 78	36 225 \$1,839.65
	¶Order by Application		
2	Bracket, Mount		
	Base Model		
	w/ASC	#.3 34 51 6 79	90 485 \$37.70
	w/o ASC	#.3 34 30 6 77	73 025 \$37.70
	S Model, John Cooper Works Model	34 51 6 79 #.3	90 485 \$37.70
	#w/Hydraulic Unit Removed		
3	Cushion, Mtg Bracket (3)	34 30 6 77	73 030 \$0.93
	Sensor, DSC	.7 34 52 6 78	*****
	Bracket, DSC Sensor	34 50 6 77	***************************************
J	Bracket, Boo derisor	34 33 6 78	*
6	Cylinder Assy, Brake Master	#1.8	\$343.71
	#Includes R&R Fluid Reservoir Assy		
7	Gasket, Mounting¶	34 31 1 15	59 007 \$3.32
8	Plug, Master Cylinder (2)¶	34 31 1 16	63 464 \$7.33
9	Nut, Mounting¶	07 12 9 90	06 196 \$1.65
	¶Included w/Brake Master Cylinder Assy		
10	Reservoir Assy, Fluid	.5 34 33 6 77	72 413 \$60.47
11	Cap, Reservoir (a)	34 33 6 77	70 607 \$23.65
12	Switch, Fluid Level (a)	34 33 6 77	70 597 \$25.32
	(a) Included w/Fluid Reservoir Assy		
13	Booster Assy, Brake		
	Base Model, S Model		
	w/DSC	#3.2 34 33 6 77	72 854 \$375.62
	w/o DSC	#3.2 34 33 6 77	72 853 \$375.62

	John Cooper Works Model	09-1	#3.2	34 33 6 772 854	\$375.62
	#Includes R&R Brake Master Cylinder				
14	Gasket, Booster Mounting (b)			34 33 6 770 915	\$5.04
15	Gasket, Mounting (b)			34 31 1 159 007	\$3.32
	(b) Included w/Brake Booster Assy				
16	Sensor, Front Wheel Speed	R	#.6	34 52 6 773 019	\$32.95
		L	#.6	34 52 6 773 019	\$32.95
	#R&R Both Sides 1.0				
17	Sensor, Rear Wheel Speed	R	#.6	34 52 6 773 020	\$32.95
		L	#.6	34 52 6 773 020	\$32.95
	#R&R Both Sides 1.0				

WHEEL

Procedure 10



Add to R&I Spare Wheel & Tire Assy

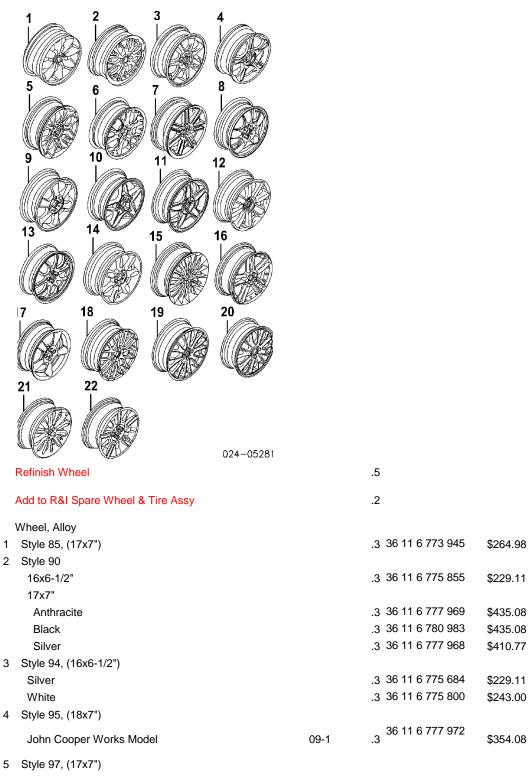
1 Wheel, Steel	.3 36 11 6 768 497	\$65.66
2 Cap, Wheel	36 11 6 768 504	\$16.00
3 Emblem, Wheel Cap	36 13 6 758 687	\$3.80
4 Bolt, Wheel	36 13 6 781 151	\$3.79
5 Stem Assy, Valve	36 12 1 178 869	\$2.83
6 Valve, Air Release¶	36 14 1 095 389	\$2.03

.5

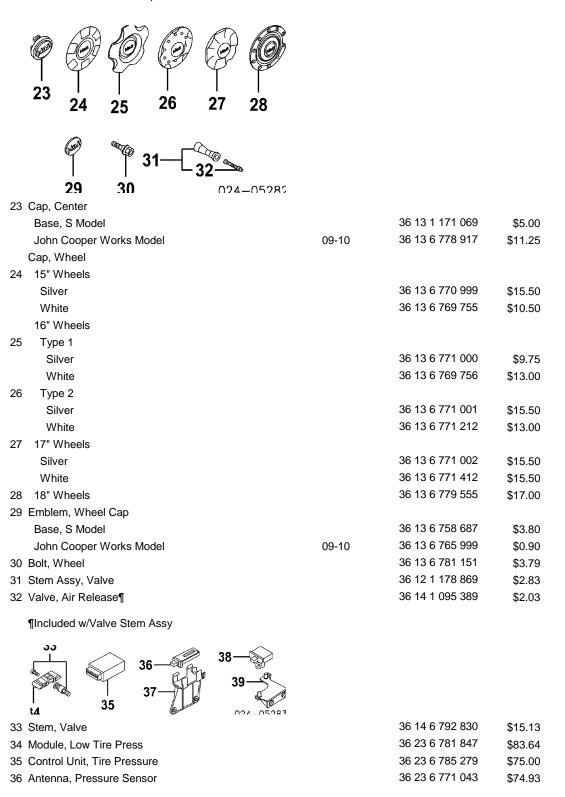
.2

¶Included w/Valve Stem Assy

ALLOY WHEEL



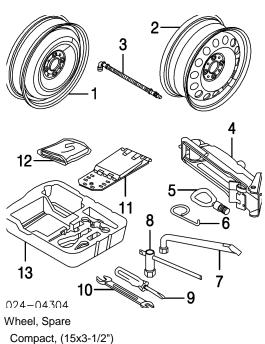
	Silver		.3 36 11 6 775 685	\$264.98
	White		.3 36 11 6 775 801	\$281.18
6	Style 98, (17x7")		.3 36 11 6 775 686	\$410.77
7	Style 99, (17x7")			
	Gray		.3 36 11 6 778 426	\$296.23
	Light		.3 36 11 6 777 970	\$281.18
	Polished Finish		.3 36 11 6 778 427	\$318.18
8	Style 100, (15x5-1/2")			
	Silver		.3 36 11 6 769 404	\$159.69
	White		.3 36 11 6 768 498	\$150.42
9	Style 101, (15x5-1/2")			
	Silver		.3 36 11 6 769 405	\$150.42
	White		.3 36 11 6 769 406	\$159.69
10	Style 102, (16x6-1/2")			
	Silver		.3 36 11 6 769 408	\$243.00
	White		.3 36 11 6 768 584	\$229.11
11	Style 103, (16x6-1/2")			
	Silver		.3 36 11 6 769 409	\$229.11
	White		.3 36 11 6 769 410	\$243.00
12	Style 104, (17x7")			
	Silver		.3 36 11 6 769 411	\$264.98
	White		.3 36 11 6 769 412	\$281.18
13	Style 105, (18x7")			
	Black		.3 36 11 6 778 428	\$303.17
	Bright		.3 36 11 6 777 973	\$403.82
14	Style 106, (17x7")		.3 36 11 6 773 800	\$296.23
15	Style 108, (17x7")		.3 36 11 6 777 356	\$264.98
16	Style 109, (18x7")		.3 36 11 6 777 357	\$548.46
17	Style 110, (17x7")		.3 36 11 6 777 960	\$264.98
18	Style 112, (17x7")		.3 36 11 6 784 130	\$327.46
19	Style 113, (17x7")			
	Black		.3 36 11 6 785 304	\$370.28
	Bright		.3 36 11 6 784 136	\$320.52
20	Style 114, (17x7")			
	John Cooper Works Model	09-1	.36 11 6 786 220 .3	\$192.09
24	Chile 116 (17v7")			
21	Style 116, (17x7")		2 26 11 6 705 455	¢204.40
	Silver		.3 36 11 6 795 455	\$281.18
22	White		.3 36 11 6 789 796	\$296.23
22	Style 117, (17x7")		.3 36 11 6 789 797	\$312.42



37 Holder, Antenna	36 20 6 780 774		
38 Sensor, Tire Pressure	36 23 6 781 846	\$77.02	
39 Bracket, Rear Sensor	36 20 6 780 776	\$6.47	

Label, Tire Pressure-See Information Labels Section

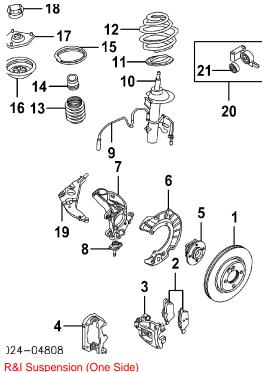
SPARE WHEEL & HARDWARE



	1)74-()4.5()4	(BF	•			
	Wheel, Spare					
1	Compact, (15x3-1/2")				36 11 1 509 164	\$47.11
2	Full Size, (15x5-1/2")				36 11 6 768 497	\$65.66
	Stem, Valve				36 12 1 178 869	\$2.83
3	Extension, Valve Stem					
	Compact Spare				31 10 6 783 425	\$25.59
4	Jack				71 12 1 501 930	\$78.11
5	Retainer, Jack				72 15 7 203 519	\$25.10
6	Puller, Hub Cap				71 11 1 507 294	\$2.49
7	Wrench, Lug				71 12 6 779 731	\$15.23
8	Socket, Wheel Bolt				71 10 1 507 977	\$15.23
9	Screwdriver				71 11 1 179 629	\$4.96
10	Wrench				71 11 1 182 747	\$5.66
11	Chock, Wheel				71 12 1 507 292	\$11.99
12	Cover, Spare Wheel				71 12 1 182 667	\$2.00
13	Tray, Tool				71 10 6 778 555	\$13.37

FRONT SUSPENSION

Procedure 11



R&I Suspension (One Side)	R	2.0
	L	2.0

O/H Suspension (Includes R&I)

One Side (Includes R&I)	R	4.5
	L	4.5
Both Sides (Includes R&I)		8.5
Adjust Four Wheel Alignment		2.0
Adjust Front Alignment		1.6
Bleed Brake System		6

NOTE 1: R&I/R&R or O/H Does Not include alignment or bleed brake system.

NOTE 2: All Parts in this section are included in overhaul unless noted otherwise.

1	$^{\circ}$	~+~	r. B	r01	-

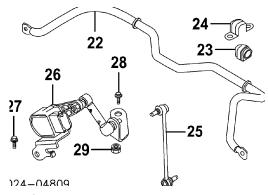
Notor, Drake				
Base Model	R	#.6	34 11 6 774 985	\$93.27
	L	#.6	34 11 6 774 985	\$93.27
S Model	R	#.6	34 11 6 774 986	\$102.82
	L	#.6	34 11 6 774 986	\$102.82
John Cooper Works Model	09-1 R	#.6	34 10 6 784 366	\$123.53

				L	#.6	34 10 6 784 366	\$123.53
	#R&R Both Sides 1.0						
2	Pad Set, Brake						
	Base Model						
	2007-09				#1.0	34 11 6 772 892	\$101.81
		2010					
	To 9-09				#1.0	34 11 6 772 892	\$101.81
	From 9-09				#1.0	34 11 6 794 056	\$98.85
	S Model				#1.0	34 11 6 778 320	\$122.65
	John Cooper Works Model			09-1	#1.0	34 11 6 789 157	\$146.49
	#Deduct .5 for Each Caliper Removed						
3	Caliper, Brake						
	Base, S Model			R	#.5	34 11 6 778 336	\$262.29
				L	#.5	34 11 6 778 335	\$262.29
	John Cooper Works Model		09-1	R	#.5	34 10 6 784 590	\$654.64
	Com Cooper Works Model					04.40.0.704.500	
,	Deceler College			L	#.5	34 10 6 784 589	\$654.64
4	Bracket, Caliper Base Model			R	#.5	34 11 6 776 921	¢106.04
	base Model			K L	#.5 #.5	34 11 6 776 921	\$126.24 \$126.24
	S Model			R	#.5 #.5	34 20 6 779 730	\$120.24
	3 Model			L	#.5 #.5	34 20 6 779 729	\$127.77
				_	<i></i>	0.1000120	Ψ127.77
	John Cooper Works Model-Serviced w/Brake						
	Caliper						
	#POP One Cide Complete DOD Dath Cides O						
	#R&R One Side Complete, R&R Both Sides .8						
5	Hub/Bearing			R	#1.0	31 22 6 776 671	\$224.10
	•			L	#1.0	31 22 6 776 671	\$224.10
	#Includes R&R Rotor, R&R Both Sides 1.8						
6	Shield, Splash			R	#.2	34 11 6 772 550	\$8.45
·	S.1.5.3, Sp. 85.1			L	#.2	34 11 6 772 549	\$8.45
	#w/Hub Removed						*
7	Knuckle, Steering			R	#1.8	31 21 6 779 796	\$167.87
	•			L	#1.8	31 21 6 779 795	\$167.87
	#Includes R&R Hub, Rotor & Splash Shield, R&	kR Both	n Side	s 3.4			
R	Joint, Lower Ball			R	#2.7	31 12 6 772 304	\$98.78
J	Sonn, Lower Dan			L	#2.7	31 12 6 772 303	\$98.78
				_			ψ00.70
	#w/Knuckle Removed Deduct 1.6, R&R Both Si 5.0	ides					

9	Sensor, Front Wheel Speed-See ABS/Brakes Section					
10	Strut					
	Base Model		R	#1.4	31 31 6 782 208	\$139.05
			L	#1.4	31 31 6 782 207	\$139.05
	S Model		R	#1.4	31 31 6 782 210	\$139.05
			L	#1.4	31 31 6 782 209	\$139.05
	John Cooper Works Model	09-1	R	#1.4	31 31 6 785 214	\$187.73
			L	#1.4	31 31 6 785 213	
11	Pad, Lower Spring		R	#1.4	31 30 6 772 745	\$4.54
			L	#1.4	31 30 6 772 745	\$4.54
12	Spring, Coil¶					
	Base Model		R	#1.4	31 33 6 756 645	\$143.83
			L	#1.4	31 33 6 756 645	\$143.83
	S Model		R	#1.4	31 33 6 759 388	\$143.83
			L	#1.4	31 33 6 759 388	\$143.83
	John Cooper Works Model	09-1	R	#1.4	31 33 6 759 388	\$143.83
			L	#1.4	31 33 6 759 388	\$143.83
	¶Order by Application					
13	Boot, Strut		R	#1.4	31 33 1 094 749	\$3.86
			L	#1.4	31 33 1 094 749	\$3.86
14	Bumper, Spring		R	#1.4	31 30 6 777 049	\$8.37
			L	#1.4	31 30 6 777 049	\$8.37
15	Pad, Upper Spring		R	#1.4	31 33 1 128 523	\$4.77
			L	#1.4	31 33 1 128 523	\$4.77
16	Plate, Upper Spring		R	#1.4	31 33 6 759 452	\$11.78
			L	#1.4	31 33 6 759 452	\$11.78
17	Mount, Upper Strut		R	#1.4	31 30 6 772 749	\$103.57
			L	#1.4	31 30 6 772 749	\$103.57
	#R&R One Side Complete, w/Knuckle Removed Dedu	ict .8				
18	Cap, Strut		R		31 31 1 139 453	\$1.53
	•		L		31 31 1 139 453	\$1.53
19	Arm, Lower Control		R	#1.4	31 12 6 772 302	\$169.96
			L	#1.4	31 12 6 772 301	\$169.96
	#w/Knuckle Removed Deduct .7, R&R Both Sides 2.6					
20	Bracket Assy, Control Arm		R	#1.9	31 12 6 772 236	\$59.45
			L	#1.9	31 12 6 772 235	\$59.45
21	Cushion, Bracket (a)		- R	#1.9	31 12 6 767 530	\$51.90
			L	#1.9	31 12 6 767 530	\$51.90
			_			Ţ .

(a) Included w/Control Arm Bracket Assy

#R&R One Side Complete, Includes R&R Control Arm

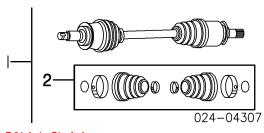


22 Bar, Stabilizer

Std Susp			
Base Model	#4.4	31 35 6 772 751	\$136.43
		31 35 6 772 752	
S Model, John Cooper Works Model	#4.4		\$136.43
Sport Susp	#4.4	31 35 6 772 753	\$136.43

орон оцэр		π ¬. ¬	01 00 0 112 100	ψ130.43		
#Includes R&R Stabilizer Bar Links, Brackets & Bushings, Not Included in O/H						
23 Bushing, Bar						
Std Susp						
Base Model	R	#	31 35 6 772 843	\$9.34		
	L	#	31 35 6 772 843	\$9.34		
			31 35 6 757 146			
S Model, John Cooper Works Model	R	#		\$9.34		
	L	#	31 35 6 757 146	\$9.34		
Sport Susp	R	#	31 35 6 772 844	\$9.34		
	L	#	31 35 6 772 844	\$9.34		
24 Bracket, Bushing	R	#	31 35 6 778 827	\$11.56		
	L	#	31 35 6 778 827	\$11.56		
25 Link, Stabilizer Bar	R	#.6	31 35 6 778 831	\$37.03		
	L	#.6	31 35 6 778 831	\$37.03		
#Not Included in O/H						
26 Sensor, Front Height			.7 37 14 6 785 209	\$68.83		
27 Screw, Mounting			07 14 6 973 023	\$0.38		
28 Bolt, Mounting			07 11 9 902 892	\$0.89		
29 Nut, Bolt			07 12 9 904 876	\$0.15		

FRONT DRIVE AXLE



R&I Axle Shaft Assy R #.4 L #.4

O/H Axle Shaft Assy (Includes R&I) R #1.2

L #1.2

#w/Necessary Suspension Components Removed

NOTE: All Parts in this section are included in O/H unless noted otherwise.

	1	Shaft	Assv.	Axle
--	---	-------	-------	------

• • • • • • • • • • • • • • • • • • • •				
Man Trans				
Base Model	R	#.4	31 60 7 589 768	\$850.16
	L	#.4	31 60 7 589 767	\$792.98
			31 60 7 585 382	
S Model, John Cooper Works Model	R	#.4		\$850.16
	i	#.4	31 60 7 596 059	\$850.16
	L	#.4		φοου. το
Auto Trans	R	#.4	31 60 7 589 764	\$850.16
	L	#.4	31 60 7 589 763	\$850.16

#w/Necessary Suspension Components Removed

2 Boot	Kıt,	Shaft¶
--------	------	--------

2007-08

Sout Kit, Shart					
Man Trans					
Base Model					
2007-08		R	#.5	31 60 6 779 993	\$66.42
		L	#.5	31 60 6 779 993	\$66.42
	2009				
To 5-09		R	#.5	31 60 6 779 993	\$66.42
		L	#.5	31 60 6 779 993	\$66.42
From 5-09		R	#.5	31 60 7 591 695	\$66.42
		L	#.5	31 60 7 591 695	\$66.42
	2010	R	#.5	31 60 7 591 695	\$66.42
		L	#.5	31 60 7 591 695	\$66.42
S Model, John Cooper Works Model					

31 60 6 779 991

\$66.42

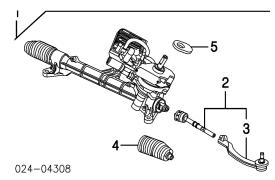
#.5

		L	#.5	31 60 6 779 991	\$66.42
	2009				
To 5-09		R	#.5	31 60 6 779 991	\$66.42
		L	#.5	31 60 6 779 991	\$66.42
From 5-09		R	#.5	31 60 7 591 694	\$68.00
		L	#.5	31 60 7 591 694	\$68.00
	2010	R	#.5	31 60 7 591 694	\$68.00
		L	#.5	31 60 7 591 694	\$68.00
Auto Trans					
2007-08		R	#.5	31 60 6 779 991	\$66.42
		L	#.5	31 60 6 779 991	\$66.42
	2009				
To 5-09		R	#.5	31 60 6 779 991	\$66.42
		L	#.5	31 60 6 779 991	\$66.42
From 5-09		R	#.5	31 60 7 591 694	\$68.00
		L	#.5	31 60 7 591 694	\$68.00
	2010	R	#.5	31 60 7 591 694	\$68.00
		L	#.5	31 60 7 591 694	\$68.00

¶Included w/Axle Shaft Assy

#w/Axle Shaft Assy Removed

FRONT STEERING LINKAGE/GEAR



R&I Steering Gear Assy

NOTE: R&I/R&R Does Not include check or adjust alignment.

1 Gear Assy, Steering		5.0 32 10 6 783 548	\$1,566.29
2 Rod Assy, Tie¶	R	32 10 6 778 548	\$140.69
	L	32 10 6 778 547	\$140.69
3 End, Tie Rod (a)¶	R	.4 32 10 6 778 438	\$87.40
	L	.4 32 10 6 778 437	\$87.40
(a) Included w/Tie Rod Assy			
4 Boot, Housing¶	R	32 10 6 778 560	\$66.42
	L	32 10 6 778 560	\$66.42
5 Seal, Housing¶		32 10 6 777 013	\$7.37

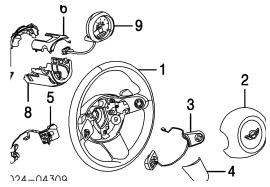
4.6

¶Included w/Steering Gear Assy

STEERING WHEEL/COLUMN

NOTE: All Parts in this section are included in overhaul unless noted otherwise.

WHEEL & TRIM



1 Wheel, Steering

Base, S Model

w/Multi-Function Switch

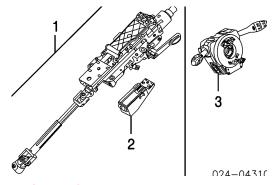
w/Multi-Function Switch			
w/Shift Paddles			
Leather		.8 32 30 6 782 598	\$580.00
Leather/Wood		.8 32 30 6 783 355	\$903.00
w/o Shift Paddles			
Leather		.8 32 30 6 782 596	\$628.00
Leather/Wood		.8 32 30 6 783 354	\$780.00
w/o Multi-Function Switch			
w/Shift Paddles		.8 32 30 6 782 597	\$537.00
w/o Shift Paddles		.8 32 30 6 782 595	\$390.95
John Cooper Works Model			
w/Multi-Function Switch			
Leather	09-1	.8 32 30 6 782 596	\$628.00
Leather/Wood	09-1	.8 32 30 6 783 354	\$780.00
w/o Multi-Function Switch			
Type 1			
Leather	09-1	.8 32 30 0 416 250	\$537.00
Alcantara	09-1	.8 32 30 0 416 251	\$537.00
Type 2			
Beige	09-1	.8 32 30 0 418 252	\$392.96
Brown	09-1	.8 32 30 0 418 253	\$392.96
Red	09-1	.8 32 30 0 432 627	\$392.96
Type 3	09-1	.8 32 30 6 782 595	\$390.95

2 Module, Driver Air Bag-See Air Bag System Section

3 Switch, Multi-Function .4 32 30 9 200 098 \$192.81

4 Cover, Bottom		32 30 6 773 643	\$10.30
5 Switch, Shifter		.4 32 30 6 776 711	\$270.02
Cover, Upper Column			
6 Front	#.6	51 45 2 752 775	\$30.13
7 Rear	#.6	51 45 2 752 763	\$14.27
8 Cover, Lower Column	#.6	51 45 2 752 776	\$24.67
#R&R Complete			
9 Tachometer			
Chrome		.8 62 10 9 201 399	\$381.17
Silver		.8 62 10 9 201 394	\$363.01

COLUMN TILT



R&I Steering Column Assy

2.23.4

2.8 32 30 2 755 517

.9 32 30 6 786 964

\$670.00

\$207.95

O/H Steering Column Assy (Includes R&I)

1	Column Assy, Steering
2	Lock, Column¶

¶Included w/Steering Column Assy

3 Switch, Combination-See Air Bag System Section

ENGINE/TRANSMISSION

Procedure 12

BASE MODEL

	12 14 3 4 11 2 22 20 16 17 18		
	R&I Engine/Trans Assy	10.3	
1	Pulley, Crankshaft	2.5 11 23 7 562 801	\$349.63
	Bolt, Mounting	11 21 7 585 184	\$4.13
	Hub, Crankshaft	11 23 7 537 697	\$64.63
4	Sprocket, Crankshaft	11 21 7 588 996	\$38.43
5	Cover Assy, Valve	1.3 11 12 7 572 724	\$301.05
6	Gasket, Cover¶	11 12 7 567 877	\$43.30
7	Cap, Oil Filler¶	11 12 7 542 116	\$19.38
	¶Included w/Valve Cover Assy		
8	Cover, Engine	.4 11 12 7 585 906	\$101.32
9	Emblem, Cover	11 12 7 594 876	\$24.53
10	Sensor, Camshaft	1.7 13 62 7 588 095	\$76.67
11	Manifold Assy, Intake	2.3 11 61 7 528 172	\$384.29
12	Gasket, Manifold (4) (a)	11 61 7 528 173	\$3.90
13	Gasket, Manifold Side (a)	11 61 7 528 174	\$3.90
	(a) Included w/Intake Manifold Assy		
14	Bracket, Mounting	11 61 7 569 966	\$8.03
15	Sensor, Pressure	.6 13 62 7 539 811	\$99.33
16	Dipstick, Eng Oil	11 43 7 585 970	\$18.17
17	Tube, Eng Dipstick	11 43 7 578 086	\$32.30
18	Pan Assy, Engine Oil	2.2 11 13 7 550 483	\$171.55
19	Plug, Oil Drain (b)	11 13 7 585 928	\$3.90
	(b) Included w/Engine Oil Pan Assy		

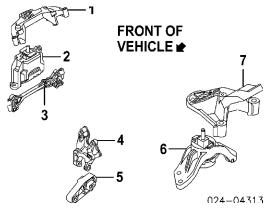
20 Gasket, Eng Oil Pan	11 13 7 565 928	\$57.41
21 Pan, Trans Oil	4.3 24 11 7 566 354	\$118.56
22 Gasket, Oil Pan	24 11 7 566 356	\$72.25

S MODEL, JOHN COOPER WORKS MODEL

	15 12 14 15 12 13 23 21 18 19			
	n24_n4811		44.0	
	R&I Engine/Trans Assy		11.2	00.40.00
	Pulley, Crankshaft		2.0 11 23 7 562 801	\$349.63
	Bolt, Mounting		11 21 7 585 184	\$4.13
	Hub, Crankshaft		11 23 7 537 697	\$64.63
	Sprocket, Crankshaft		11 21 7 588 996	\$38.43
	Cover Assy, Valve		1.3 11 12 7 585 907	\$301.05
	Gasket, Cover¶		11 12 7 572 851	\$43.30
7	Cap, Oil Filler¶		11 12 7 572 848	\$19.38
	¶Included w/Valve Cover Assy			
8	Cover, Engine		.4 11 12 7 561 715	\$101.32
9	Emblem, Cover		11 12 7 594 876	\$24.53
10	Sensor, Camshaft		13 62 7 588 095	\$76.67
11	Manifold Assy, Intake		1.6 11 61 7 595 078	\$384.29
12	Gasket, Manifold (4) (a)		11 61 7 528 340	\$3.90
13	Gasket, Manifold Side (a)		11 61 7 528 341	\$5.00
14	Bushing, Mtg (3) (a)		11 61 7 593 928	\$1.67
	(a) Included w/Intake Manifold Assy			
15	Bracket, Mounting		11 61 7 528 342	\$17.24
	Sensor, Pressure			
-	S Model		.6 13 62 7 540 508	\$99.33
	John Cooper Works Model	09-1	.6 13 62 7 582 552	\$99.33
17	Dipstick, Eng Oil	•	11 43 7 585 970	\$18.17
	Tube, Eng Dipstick		.6 11 43 7 578 086	\$32.30
	· · · · · · · · · · · · · · · · · · ·			ŢJ _ .00

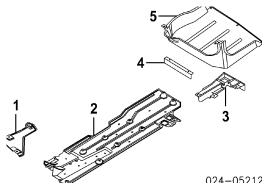
19 Pan Assy, Engine Oil	2.2 11 13 7 550 483	\$171.55
20 Plug, Oil Drain (b)	11 13 7 585 928	\$3.90
(b) Included w/Engine Oil Pan Assy		
21 Gasket, Eng Oil Pan	11 13 7 565 928	\$57.41
22 Pan, Trans Oil	4.3 24 11 7 566 354	\$118.56
23 Gasket, Oil Pan	24 11 7 566 356	\$72.25
R&I Engine/Trans Assy	11.2	

ENGINE/TRANSMISSION MOUNTS



4.0				
1 Bracket, Eng Mount		#.4	22 11 6 772 032	\$54.00
#w/Mount Removed				
2 Mount, Front				
Base Model			2.0 22 11 6 778 645	\$94.48
S Model, John Cooper Works Model			22 11 6 782 374 2.0	\$94.48
3 Brace, Mount			22 11 6 772 034	\$100.22
4 Bracket, Left Mount	L		22 11 6 780 439	\$44.03
5 Mount, Left Eng	L		1.5 22 11 6 783 094	\$41.68
6 Bracket, Trans Mount				
Man Trans				
Base Model			.2 22 31 6 779 806	\$78.94
			22 31 6 784 355	
S Model, John Cooper Works Model			.2	\$209.83
Auto Trans			.2 22 31 6 784 357	\$209.83
7 Mount, Trans			1.3 22 31 6 872 019	\$67.73

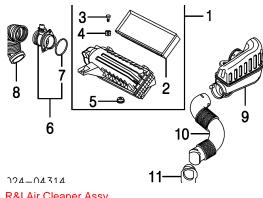
ENGINE/BODY UNDER COVERS



1 Cover, Front Under		.2 51 75 2 755 449	\$14.80
2 Cover, Center Underbody	R	.4 51 75 2 753 164	\$64.16
	L	.4 51 75 2 753 163	\$64.16
3 Cover, Outer Under	R	.2 51 75 7 129 682	\$14.38
	L	.2 51 71 1 502 918	\$14.38
4 Deflector, Rear Cover	R	.2 51 71 1 481 429	\$12.27
	L	.2 51 71 1 481 429	\$12.27
5 Cover, Rear Under¶			
Base Model		.3 51 71 1 149 159	\$48.16
¶Order by Application			

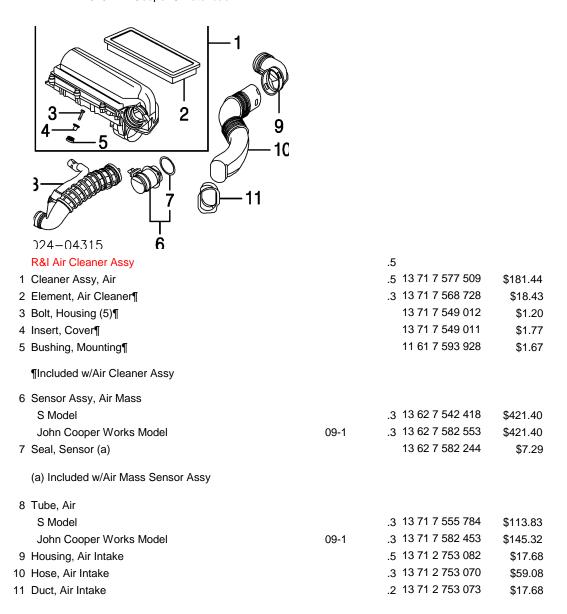
AIR CLEANER

BASE MODEL

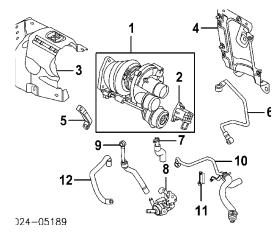


	774_04314			
	R&I Air Cleaner Assy	.5		
1	Cleaner Assy, Air	.5	13 71 7 565 95	5 \$181.44
2	Element, Air Cleaner¶	.3	13 71 7 561 23	5 \$26.97
3	Bolt, Housing¶		13 71 7 555 26	4 \$1.79
	Bushing, Housing¶			
4	Type 1		13 71 7 534 82	6 \$2.39
5	Type 2, (2)		13 71 7 561 23	6 \$3.58
	¶Included w/Air Cleaner Assy			
6	Sensor Assy, Air Mass	.3	13 62 7 542 41	8 \$421.40
7	Seal, Sensor (a)		13 62 7 582 24	4 \$7.29
	(a) Included w/Air Mass Sensor Assy			
8	Duct, Sensor		13 71 7 524 71	3 \$45.48
9	Housing, Air Intake	.5	13 71 2 754 42	5 \$59.08
10	Hose, Air Intake	.3	13 71 2 754 42	4 \$35.42
11	Duct, Air Intake	.2	13 71 2 754 42	6 \$17.68

S MODEL, JOHN COOPER WORKS MODEL



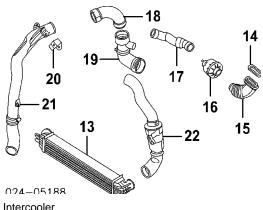
TURBOCHARGER/INTERCOOLER



	Turbocharger	Assy
--	--------------	------

S Model		5.5 11 65 7 600 890	\$1,730.02
John Cooper Works Model	09-1	5.5 11 65 7 583 149	\$1,781.63
2 Valve, Regulator¶		.7 11 65 7 593 273	\$61.56
¶Included w/Turbocharger Assy			
3 Shield, Heat		11 65 7 595 605	\$49.07
4 Plate, Cover		11 62 7 553 087	\$34.89
5 Support, Turbo		11 65 7 588 504	\$33.07
6 Tube, Oil Feed		11 65 7 534 454	\$36.75
7 Tube, Oil Return		11 65 7 583 838	\$31.68

- 8 Pump, Auxiliary Water-See Cooling Section
- 9 Hose, Turbo Cooler Feed-See Cooling Section
- 10 Hose, Turbo Cooler Return-See Cooling Section
- 11 Bracket, Hose-See Cooling Section
- 12 Hose, By-Pass-See Cooling Section

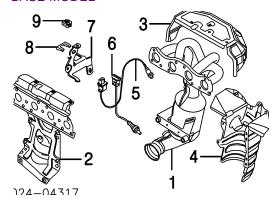


13	Intercooler	#.8	17 51 2 751 277	\$315.32
	#w/Front Bumper Cover Assy Removed			
14	Gasket, Air Intake		13 74 2 756 046	\$8.48
15	Duct, Air Intake		.3 13 74 2 756 043	\$30.39
16	Generator, Sound		.4 13 74 2 756 044	\$104.52
17	Tube, Air	#.3	13 74 2 756 042	\$48.34
	Tube, Air Intake			
18	Upper	#.3	13 71 2 753 077	\$59.08
19	Lower	#.3	13 71 2 753 078	\$82.78
	#Each Additional .1			
20	Sensor, Air Temperature			
	S Model		13 62 7 535 069	\$99.33
	John Cooper Works Model	09-10	13 62 7 582 551	\$99.33
21	Tube, Charge Air	#.6	13 71 7 593 369	\$60.55
22	Tube, Cooler to Turbo	#.6	13 71 2 753 075	\$106.23

#w/Intercooler Removed Deduct .3

EXHAUST

BASE MODEL



R&I Exhaust System Complete

#1.8

R&R Exhaust System Complete

#2.3

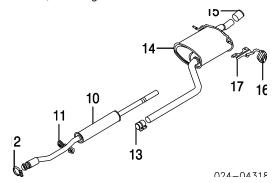
#Does Not Include R&R Exhaust Manifold & Heat Shield

1 Manifold, Exhaust	4.0 18 40 7 559 400	\$926.69
2 Gasket, Manifold	18 40 7 563 111	\$72.43
3 Shield, Upper Heat	#.4 18 40 7 584 307	\$28.11
4 Shield, Lower Heat	#.4 18 40 7 584 308	\$28.11

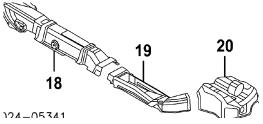
- 5 Sensor, Upper Oxygen-See Emission System Section
- 6 Sensor, Lower Oxygen-See Emission System Section

#Included in R&R Exhaust Manifold

7 Bracket, Sensor	11 78 7 566 136	\$12.02
8 Clip, Sensor	07 14 7 544 063	\$0.53
9 Bracket, Mounting	07 14 7 543 533	\$0.15



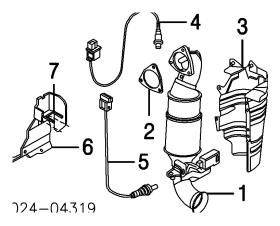
10 Pipe, Front Exhaust		1.0 18 30 7 594 374	\$1,189.29
11 Mount, Front Pipe (2)		18 30 2 753 085	\$16.79
12 Clamp, Pipe		18 30 2 756 351	\$12.45
13 Coupling, Exhaust Pipe		18 30 7 536 424	\$36.52
14 Muffler w/Pipe, Rear		1.3 18 30 2 753 110	\$415.21
15 Extension, Pipe		.3 18 30 2 753 086	\$78.00
16 Mount, Rear Pipe (2)		18 30 2 753 085	\$16.79
17 Hanger, Pipe	R	18 30 2 753 104	\$21.95
	L	18 30 2 753 103	\$21.95



18 Shield, Front Heat	#.3	51 48 2 753 130	\$62.65
19 Shield, Center Heat	#.3	51 48 2 753 131	\$62.65
20 Shield, Rear Heat	#.3	51 48 2 757 191	\$126.12

#w/Exhaust System Removed

S MODEL, JOHN COOPER WORKS MODEL



R&I Exhaust System Complete #1.8

R&R Exhaust System Complete #2.3

#Does Not Include R&R Exhaust Manifold & Heat Shield

1 Manifold, Exhaust			
S Model		5.8 18 30 7 558 755	\$926.69
John Cooper Works Model	09-1	5.8 18 30 7 583 146	\$941.20

14 Mount, Rear Pipe (2)

15 Hanger, Pipe

2 Gasket, Manifold			
S Model		5.8 18 30 7 574 127	\$10.48
John Cooper Works Model	09-1	5.8 18 30 7 589 503	\$11.16
3 Shield, Heat	#.7	18 30 7 595 606	\$33.37
5 5.1.5ta, 1.5ta.			ψου.σ.
Sensor, Upper Oxygen-See Emission System Section			
Sensor, Lower Oxygen-See Emission System Section			
#Included in R&R Exhaust Manifold			
6 Bracket, Sensor		11 78 7 547 747	\$17.98
7 Clip, Sensor		07 14 7 544 063	\$0.53
. O.I.P., CO.II.CO.			ψ0.00
15—14 8 10 11 12 12			
8 Pipe, Front Exhaust			
S Model		1.0 18 30 7 593 465	\$1,189.29
John Cooper Works Model	09-1	1.0 18 30 7 587 361	\$365.65
9 Mount, Front Pipe (2)		18 30 2 753 085	\$16.79
10 Clamp, Pipe		18 30 2 756 352	\$14.80
11 Coupling, Exhaust Pipe		18 30 7 560 778	\$36.52
12 Muffler w/Pipe, Rear			
S Model			
2007		1.3 18 30 2 756 516	\$415.21
2008			
To 7-08		1.3 18 30 2 756 516	\$415.21
From 7-08		1.3 18 30 2 757 748	\$415.21
2009-10		1.3 18 30 2 757 748	\$415.21
John Cooper Works Model			
2009		1.3 18 30 7 587 363	\$415.21
2010			
To 5-10		1.3 18 30 7 587 363	\$415.21
From 5-10		1.3 18 30 7 612 477	
13 Extension, Pipe		.3 18 30 2 753 096	\$78.00
		40.00.0.==0.00=	

18 30 2 753 085

18 30 2 755 168

18 30 2 755 167

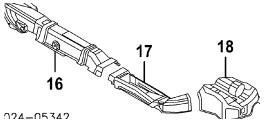
R

L

\$16.79

\$34.07

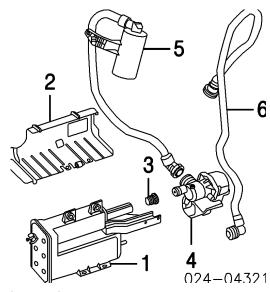
\$34.07



16 Shield, Front Heat	#.3	51 48 2 753 130	\$62.65
17 Shield, Center Heat	#.3	51 48 2 757 771	\$58.18
18 Shield, Rear Heat	#.3	51 48 2 754 958	\$126.12

#w/Exhaust System Removed

EMISSION SYSTEM

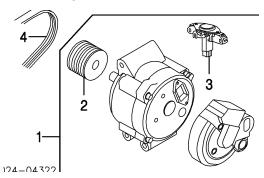


1 Canister, Carbon		8 16 13 2 757 327	\$285.33
2 Bracket, Canister		16 13 2 757 224	\$26.95
3 Grommet, Mounting		16 13 1 183 912	\$2.20
4 Pump, Leak Detector	1.	0 16 13 7 193 479	\$132.38
5 Hose, Vent		16 13 2 752 342	\$53.57
6 Hose, Breather		8 16 12 2 752 537	\$42.27
Sensor, Upper Oxygen			
Base Model	#.6	11 78 7 590 713	\$225.85
		11 78 7 549 860	
S Model, John Cooper Works Model	#.6		\$225.85
Sensor, Lower Oxygen	#.8	11 78 7 548 961	\$225.85

#Included in R&R Exhaust Manifold

ELECTRICAL

ALTERNATOR



1 Alternator Assy 120 Amp

2007

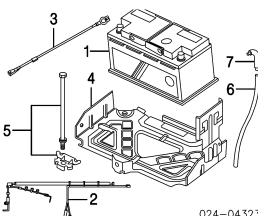
To 3-07		3.4 12 31 7 576 513	\$763.27
From 3-07		3.4 12 31 7 576 514	\$561.43
2008-10		3.4 12 31 7 576 514	\$561.43
150 Amp		3.4 12 31 7 575 873	\$603.53
2 Pulley, Alternator¶			
120 Amp	#.2	12 31 7 561 554	\$33.88
150 Amp	#.2	12 31 7 575 518	\$84.19
3 Regulator, Voltage¶			
120 Amp	#.3	12 31 7 576 516	\$130.93
150 Amp	#.3	12 31 7 561 558	\$134.85

¶Included w/Alternator Assy

#w/Alternator Assy Removed

4 Belt, Drive-See Cooling Section

BATTERY



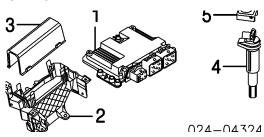
1 Battery		.3 N.A.	
2 Cable, Positive		2.3 12 42 7 571 136	\$73.78
3 Cable, Negative		.6 12 42 7 534 570	\$29.29
4 Tray, Battery	#.7	51 78 2 752 624	\$29.80
#Includes R&R Battery			
5 Hold-Down, Battery		61 21 2 755 516	\$12.92
6 Hose, Vent		61 21 1 377 745	\$2.07
7 Connector, Tube		61 21 1 377 835	\$0.57



1 Horn Kit

High Note 61 33 2 753 033 #.3 \$34.78 Low Note #.3 61 33 2 753 032 \$36.63 #R&R Complete .5

IGNITION



R&R Ignition Coils Complete

R&R Ignition Coils Complete		.8	
1 Control Unit, DME			
Base Model		.5 12 14 7 590 860	\$1,242.46
		12 14 7 590 858	
S Model, John Cooper Works Model		.5	\$1,242.46
2 Bracket, Control Unit		12 14 2 754 241	\$21.43
3 Cover, Control Unit		12 14 2 754 564	\$10.62
4 Coil, Ignition (4)			
Base Model	07	.4 12 13 7 550 012	\$36.78
	08-1	4 12 13 7 594 937	\$58.16

S Model, John Cooper Works Model

12 13 7 575 010

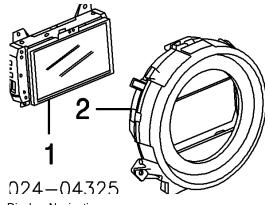
\$58.16

5 Retainer, Coil (4)

12 13 1 437 986

\$1.12

NAVIGATION SYSTEM



#.7 65 50 3 451 496 \$1,988.33

1 Display, Navigation

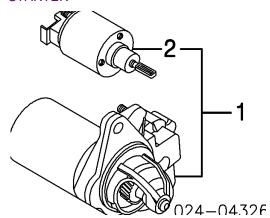
#Included in R&R Instrument Cluster

2 Cluster, Instrument-See Instrument Panel Section

Base, Antenna-See Roof Section

Mast, Antenna-See Roof Section

STARTER



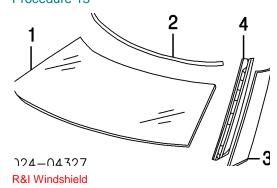
- 1 Starter Assy
- 2 Solenoid, Starter¶

¶Included w/Starter Assy

1.6 12 41 7 582 309 13 41 7 561 559 \$273.03 \$127.57

WINDSHIELD

Procedure 13

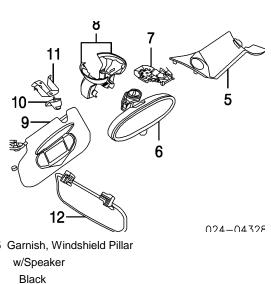


#Includes Clean Up Old Adhesive as Necessary

Add to R&I/R&R Windshield

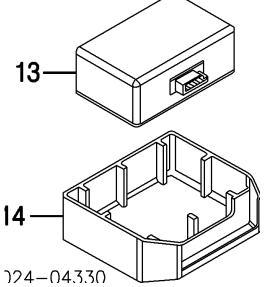
w/Rain Sensor		.3	
1 Glass, Windshield			
Mini			
w/Visibility Pkg	#4.4	51 31 2 753 976	
w/o Visibility Pkg			
w/Rain Sensor	#4.4	51 31 2 753 977	\$279.94
w/o Rain Sensor	#4.4	51 31 2 753 978	\$253.77
NAGS			
w/Rain Sensor			
Heated	#4.4	FW02842GTY	\$711.20
Non-Heated	#4.4	FW02841GTN	
w/o Rain Sensor	#4.4	FW02840GTN	\$448.90
#Includes Clean Up Old Adhesive as Necessary			
Adhesive, Glass		N.A.	
2 Moulding, Upper		51 31 7 155 304	\$17.60
3 Moulding, Side	R	51 13 7 272 584	\$49.69
	L	51 13 7 272 583	\$49.69
4 Seal, Side Moulding	R	51 33 7 146 096	\$18.82
	L	51 33 7 146 095	\$18.82

#4.7



		024-04328			
5	Garnish, Windshield Pillar				
	w/Speaker				
	Black		R	.2 51 43 2 756 770	\$35.60
			L	.2 51 43 2 756 769	\$35.60
	Gray		R	.2 51 43 2 756 768	\$35.60
			L	.2 51 43 2 756 767	\$35.60
	w/o Speaker				
	Black		R	.2 51 43 2 753 000	\$24.70
			L	.2 51 43 2 752 999	\$24.70
	Gray		R	.2 51 43 2 752 998	\$24.98
			L	.2 51 43 2 752 997	\$24.98
6	Mirror, Rear View				
	w/Auto Dimming			.2 51 16 2 753 175	\$376.97
	w/o Auto Dimming			.2 51 16 9 218 051	\$144.14
7	Bracket, Mirror			51 16 2 752 989	\$6.44
8	Cover, Baseplate			51 16 7 163 810	\$5.96
9	Visor, Sun				
	Black		R	.2 51 16 7 263 962	\$80.40
			L	.2 51 16 7 263 961	\$80.40
	Gray		R	.2 51 16 2 753 546	\$79.00
			L	.2 51 16 2 753 545	\$79.00
10	Bracket, Visor				
	Black		R	51 16 2 756 978	\$1.86
			L	51 16 2 756 978	\$1.86
	Gray		R	51 16 2 756 977	\$1.86
			L	51 16 2 756 977	\$1.86
11	Support, Bracket		R	41 22 1 170 050	\$2.54
			L	41 22 1 170 050	\$2.54
12	Visor, Auxiliary				
	w/Sunroof				
	Black			51 16 2 753 585	\$44.67
	Gray			51 16 2 753 586	\$44.67
	w/o Sunroof				

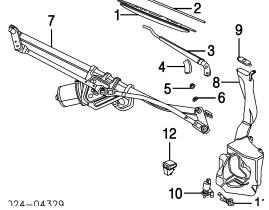
51 16 2 753 551 Black \$44.67 51 16 2 753 552 Gray \$44.67



13 Sensor, Rain

14 Cover, Sensor





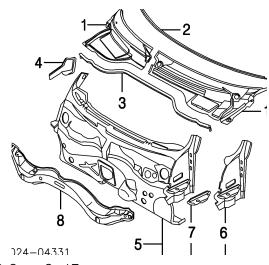
<u> 174-04379</u>	1.			
1 Blade, Wiper	R	.1	61 61 0 028 137	\$39.58
	L	.1	61 61 0 028 137	\$39.58
2 Insert, Wiper	R	.1	61 61 8 229 196	\$6.66
	L	.1	61 61 8 229 196	\$6.66
3 Arm, Wiper	R	#.2	61 61 7 248 407	\$34.33
	L	#.2	61 61 7 248 407	\$34.33
#Includes R&R Wiper Blade Assy	or Insert			

4 Cover, Arm Nut R 61 61 7 248 409 \$5.03

		L			61 61 7 248 409	\$5.03
5	Nut, Wiper Arm	R			07 11 9 922 856	\$0.56
		L			07 11 9 922 856	\$0.56
6	Washer	R			07 11 9 936 442	\$1.48
		L			07 11 9 936 442	\$1.48
7	Link, Wiper			1.4	61 61 7 138 789	\$178.98
8	Reservoir, Washer					
	w/Headlamp Washer			.7	61 66 7 157 121	\$44.27
	w/o Headlamp Washer				61 67 7 157 124	\$49.31
9	Cap, Reservoir				61 66 7 228 601	\$3.88
	Screw, Mtg (2)				51 64 2 752 568	\$0.89
10	Pump, Windshield Washer		#.7		67 12 8 377 987	\$70.32
	#Included in R&R Fluid Reservoir					
	Pump, H/Lamp Washer-See Front Lamps Section					
11	Sensor, Level				61 31 8 360 459	\$32.02
12	Nozzle, Washer	R	#.2		61 66 2 756 194	\$11.95
		L	#.2		61 66 2 755 722	\$11.95
	#Included in R&R Hood					

COWL & DASH

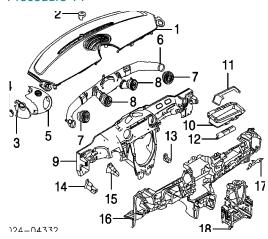
Procedures 14 and 28



	1/4-(14.3.3)				
1	Cover, Cowl Top	R	#.7	51 13 2 751 210	\$40.27
		L	#.7	51 13 2 751 209	\$40.27
	#R&R Complete, Includes R&I Wiper Arms				
2	Strip, Retainer			51 31 2 756 196	\$29.77
3	Seal, Panel			51 71 7 148 848	\$23.25
4	Bracket, Panel	R		51 13 2 756 405	\$8.37
5	Panel Assy, Dash			41 00 2 755 187	\$646.13
6	Panel, Side¶	R		41 00 2 755 192	\$94.51
		L		41 00 2 755 191	\$94.51
7	Reinforcement, Side¶	R		41 11 2 754 688	\$9.90
		L		41 11 2 754 687	\$9.90
	¶Included w/Dash Panel Assy				
8	Support, Dash			41 11 2 754 705	\$133.92

INSTRUMENT PANEL

Procedure 14



R&I Instrument Panel Reinforcement

5.3

NOTE: All Parts in this section are included in R&R Instrument Panel Reinforcement unless noted otherwise.

1 Pad, Instrument Panel		2.4 51 45 2 752 769 \$449.08
2 Cover, Sensor		51 45 2 752 896 \$3.25
3 Cover, Outer	R	.2 51 45 2 752 906 \$10.71
	L	.2 51 45 2 752 905 \$10.71
4 Cover, Inst Panel Hole	R	51 45 2 752 908 \$5.62
	L	51 45 2 752 907 \$5.62
5 Bezel, Outer Nozzle		
Chrome	R	.7 51 45 2 752 800 \$30.87
	L	.7 51 45 2 752 799 \$30.87
Silver	R	.7 51 45 2 752 798 \$34.22
	L	.7 51 45 2 752 797 \$34.22
6 Duct, Air		51 45 2 756 337 \$35.93
7 Grille, Outer Vent	R	.4 51 45 2 752 764 \$30.98
	L	.4 51 45 2 752 764 \$30.98
8 Grille, Inner Vent	R	.4 51 45 2 754 452 \$30.98
	L	.4 51 45 2 754 451 \$30.98
9 Frame, Instrument Panel		#6.2 51 45 2 757 005 \$288.89

#Includes R&R Instrument Panel Pad

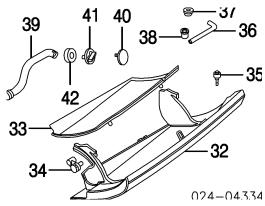
Module, Passenger Air Bag-See Air Bag System Section

10 Support, Air Bag Module-See Air Bag System Section

11 Cover, Passenger Air Bag Module-See Air Bag System	em Section
-------------------------------------------------------	------------

12 Support, Panel		51 45 2 752 767	\$16.83
13 Bracket, Panel		51 45 2 752 759	\$6.18
14 Bracket, Outer Side (3)	L	51 45 2 752 786	\$23.25
15 Bracket, Lower	L	51 45 2 752 787	\$9.43
16 Reinforcement, Panel	07 #8.4	51 45 2 752 761	\$152.22
	08 #8.4	51 45 9 184 569	\$152.22
	09-1 #8.4	51 45 9 191 863	\$152.22
#Includes R&R Instrument Panel Frame			
17 Bracket, Striker		51 45 2 752 778	\$21.63
18 Carrier, Center		2.1 51 45 2 752 777	\$98.89
20 22 31 30 29 21 24 1 25 19 24 1 25 27 23 28 28			
19 Panel, Trim	R	.4 51 45 2 752 889	\$122.30
	L	.4 51 45 2 752 870	\$123.17
¶Black listed, Order by Application			
Cover, Inner			
20 Outer	R	.5 51 45 2 754 709	\$5.87
21 Center	R	51 45 2 754 707	\$5.87
22 Bolster, Pass Knee			
Blue	R	.6 51 45 2 752 849	\$121.76
Gray	R	.6 51 45 2 752 845	\$121.76
Red	R	.6 51 45 2 752 848	\$121.76
White	R	.6 51 45 2 752 846	\$121.76
Yellow	R	.6 51 45 2 752 847	\$121.76
Bolster, Driver Knee			
23 Outer		_, ,	
Blue	L	.6 51 45 2 752 861	\$52.35
Gray	L	.6 51 45 2 752 857	\$52.35
Red	L	.6 51 45 2 752 860	\$52.35
White	L	.6 51 45 2 752 858	\$52.35
Yellow	L	.6 51 45 2 752 859	\$52.35
24 Inner			

Blue		L	.4 51 45 2 752 855	\$56.46
Gray		L	.4 51 45 2 752 851	\$56.46
Red		L	.4 51 45 2 752 854	\$56.46
White		L	.4 51 45 2 752 852	\$56.46
Yellow		L	.4 51 45 2 752 853	\$56.46
25 Button, Glove Box Release		R	51 16 2 752 837	\$11.87
26		L	51 45 2 752 836	\$12.00
27 Cover, Outer Lower				
Beige		R	.3 51 45 7 267 052	\$8.03
		L	.3 51 45 2 755 591	\$8.03
Black		R	.3 51 45 7 267 050	\$8.03
		L	.3 51 45 2 755 587	\$8.03
Gray		R	.3 51 45 2 755 590	\$8.03
		L	.3 51 45 2 755 589	\$8.03
Red		R	.3 51 45 7 267 054	\$8.03
		L	.3 51 45 2 755 593	\$8.03
28 Panel, Lower Trim				
2007-08		L	.5 51 16 2 757 647	\$34.87
	2009			
To 7-09		L	.5 51 16 2 757 647	\$34.87
From 7-09		L	.5 51 16 9 191 859	\$34.87
	2010	L	51 16 9 191 859	\$34.87
29 Compartment, Storage			.3 51 45 2 754 670	\$27.30
30 Carrier, Instrument Panel			51 45 9 166 599	\$106.57
31 Bracket, Carrier			51 45 2 752 894	\$41.86
44 40	®—— ` 4 /			



32 Door, Glove Box	07-0	.3 51 16 2 752 827	\$143.84
	09-1	.3 51 16 2 752 811	\$143.84
33 Insert, Glove Box		51 16 2 756 154	\$10.02
34 Damper, Glove Box		51 16 7 056 614	\$17.43
35 Bumper, Glove Box (2)		51 16 8 244 385	\$1.18
36 Hinge, Glove Box (2)		51 16 2 752 820	\$3.52
Bushing, Hinge			
37 Type 1, (4)		51 16 2 754 661	\$3.17
38 Type 2, (4)		51 16 2 752 821	\$3.25

39 Hose, Air	51 16 2 752 817	\$8.63
40 Cap, Cover	51 16 2 751 110	\$3.05
41 Regulator, Air	51 16 2 751 723	\$1.82
42 Seal, Duct	51 16 2 754 662	\$0.51
45 47 48 53 49 57 54 50 52 58 59 59 60		
43 Cover, Instrument Chrome	.4 51 45 2 752 794	\$53.79
Silver	.4 51 45 2 752 793	\$58.57
44 Cluster, Instrument	.4 01 10 2 102 100	ψου.στ
w/Navigation System	.8 62 10 9 180 144	\$737.58
45 Speedometer	.5 = 10 = 10 = 111	φ. σσσ
w/o Navigation System	.6 62 10 9 136 194	\$647.86
46 Trim, Instrument Cluster	.0 02 10 0 100 101	ΨΟ-11.00
w/o Navigation System	62 11 6 977 981	\$10.74
w/o Navigation System	02 11 0 077 001	ψ10.74
47 Display, Navigation-See Electrical Section		
48 Booster, Radio	.7 65 12 3 455 540	\$794.08
49 Player, CD	.7 65 83 9 182 158	\$321.15
50 Player, DVD	.7 65 83 9 237 706	\$100.38
51 Bezel, CD Changer	.4 65 83 9 133 789	\$302.20
52 Cover, Panel Center	.3 65 63 9 133 794	

65 83 6 933 200

.5 65 83 6 944 031

\$74.33

\$138.79

w/Navigation System

53 Fan, Stereo Cooling

55 Cover, Front w/ATC

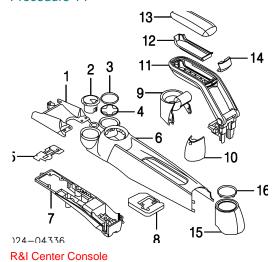
54 Sensor, Magnetic Field

2007-08			.6 51 16 2 752 900	\$50.94
	2009			
To 3-09			.6 51 16 2 752 900	\$50.94
From 3-09			.6 51 16 9 151 326	\$50.94
	2010		.6 51 16 9 151 326	\$50.94
w/o Navigation System				
2007-08			.6 51 16 2 752 899	\$50.94
	2009			
To 3-09			.6 51 16 2 752 899	\$50.94
From 3-09			.6 51 16 9 151 325	\$50.94
	2010		.6 51 16 9 151 325	\$50.94
w/o ATC				
2007-08			.6 51 16 2 754 160	\$50.94
	2009			
To 3-09			.6 51 16 2 754 160	\$50.94
From 3-09			.6 51 16 9 151 327	\$50.94
	2010		.6 51 16 9 151 327	\$50.94
56 Cover, Control			51 45 2 752 909	\$6.81
57 Panel, Side Trim		R	.2 51 45 2 752 774	\$31.23
		L	.2 51 45 2 752 773	\$31.23
58 Control, A/C				
w/ATC			.6 64 11 3 454 852	\$632.10
w/o ATC			.6 64 11 3 454 854	\$421.38
59 Switch, Seat Heater		R	.3 64 11 3 452 081	\$35.54
		L	.3 64 11 3 452 082	\$35.54
60 Cover, Switch			64 11 3 452 078	\$67.71
Harness, Instrument Panel				
w/Navigation System		#		\$655.02
w/o Navigation System		#	£ 61 12 9 140 904	\$655.02

#Not Included in R&R Instrument Panel

CENTER CONSOLE

Procedure 14



NOTE: All Parts in this section are included in R&R Center Console Assy unless noted otherwise.

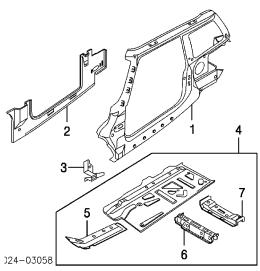
.5

		,	
1 Trim, Front		.4 51 16 2 757 006	\$30.27
2 Ashtray		51 16 2 756 336	\$21.37
3 Ring, Trim			
Chrome	R	51 16 2 756 166	\$10.79
	L	51 16 2 756 166	\$10.79
Black	R	51 16 2 756 163	\$12.15
	L	51 16 2 756 163	\$12.15
Silver	R	51 16 2 756 165	\$12.32
	L	51 16 2 756 165	\$12.32
4 Insert, Cup Holder	R	51 16 2 756 159	\$4.91
	L	51 16 2 756 159	\$4.91
5 Bracket, Front Console		51 16 9 183 593	\$9.75
6 Console, Center			
w/Navigation System		.8 51 16 2 756 157	\$63.62
w/o Navigation System		.8 51 16 2 756 156	\$63.62
7 Bracket, Rear Console	#.3	51 16 2 752 947	\$11.68
#w/Center Console Removed, Not Included in R&	R Center Console		
8 Pad, Console		51 47 2 754 964	\$8.77
9 Holder, Cup		.2 51 16 9 194 039	\$17.07
10 Cover, Cup Holder	R	51 16 9 185 112	\$7.14
	L	51 16 9 185 111	\$7.14
11 Armrest		.4 51 16 9 185 114	\$130.13
12 Tray, Armrest		51 16 6 954 280	\$5.54

13 Pad, Armrest	.2 51 16 2 753 341	\$60.11
14 Cover, Armrest	51 16 2 756 045	\$5.71
15 Holder, Rear Cup	.2 51 16 2 756 167	\$13.55
16 Ring, Trim		
Chrome	51 16 2 756 172	\$10.12
Black	51 16 2 756 169	\$11.32
Silver	51 16 2 756 171	\$11.32

ROCKER/PILLARS/FLOOR

Procedures 14, 15 and 28 SHEET METAL



72. 00000	ı			
Refinish Door Opening Panel	R	3.0		
	L	3.0		
Refinish Hinge Pillar Section	R	1.0		
	L	1.0		
Refinish Rocker Panel Section	R	2.0		
	L	2.0		
Section Hinge Pillar	R	#8.5		
	L	#8.5		
#w/Windshield Removed				
Section Rocker Panel	R	8.0		
	L	8.0		
Add to R&R Door Opening Panel				
To R&I/R&R Side Curtain Air Bags	R	#1.2		
	L	#1.2		
#Includes R&I/R&R Center Air Bag Sensor				
1 Panel, Door Opening	R	#13.0	41 00 2 755 066	\$1,191.32
r randi, boor opening	L	#13.0	41 00 2 755 065	\$1,191.32
#w/Windshield Removed	L	#13.0	41 00 2 755 005	φ1,191.32
	_		44 04 7 004 000	****
2 Panel, Inner	R		41 21 7 264 006	\$356.02
	L	3.5	41 21 7 264 005	\$356.02

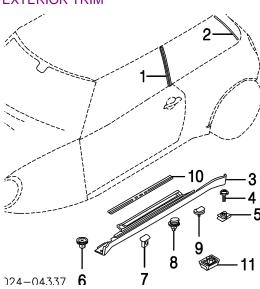
3 Support, Side-See Front Inner Structure Section

Striker, Latch-See Front Door Section

4 Panel Assy, Floor	R	41 12 7 035 326	\$340.07
	L	41 12 7 035 325	\$340.07
5 Reinf, Floor¶	R	41 00 2 757 198	\$42.67
	L	41 00 2 757 197	\$42.67
6 Bracket, Front Seat¶	R	1.5 41 11 7 125 444	\$45.90
	L	1.5 41 11 7 125 443	\$45.90
7 Bracket, Rear Seat¶	R	1.5 41 11 7 125 446	\$45.90
	1	1.5 41 11 7 125 445	\$45.90

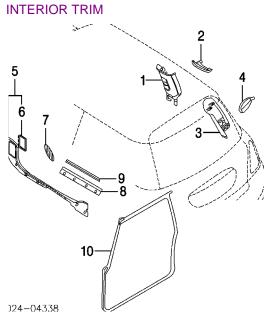
¶Included w/Floor Panel Assy

EXTERIOR TRIM



Refinish Rocker Panel Moulding	R	1.2	
	L	1.2	
1 Applique, Front	R	.2 51 13 7 146 100	\$25.42
	L	.2 51 13 7 146 099	\$25.42
2 Applique, Rear	R	.2 51 13 7 146 102	\$23.34
	L	.2 51 13 7 146 101	\$23.34
3 Moulding, Rocker Panel (P)			
w/Aero Pkg	R	.4 51 77 7 199 876	\$270.08
	L	.4 51 77 7 199 875	\$270.08
w/o Aero Pkg	R	.4 51 77 7 147 916	\$90.94
	L	.4 51 77 7 147 915	\$90.94
(P) Paint to Match			

4	Screw, Mounting (2/Side)		R	51 71 2 752 360	\$0.53
			L	51 71 2 752 360	\$0.53
5	Nut, Retainer		R	07 14 6 988 451	\$0.38
			L	07 14 6 988 451	\$0.38
6	Rivet (8/Side)		R	07 13 0 702 966	\$0.51
			L	07 13 0 702 966	\$0.51
	Clip, Moulding¶				
7	Type 1, (4/Side)		R	51 71 1 496 621	\$0.32
			L	51 71 1 496 621	\$0.32
8	Type 2, (9/Side)		R	07 13 1 480 419	\$0.77
			L	07 13 1 480 419	\$0.77
9	Type 3, (2/Side)		R	07 13 7 073 915	\$0.77
			L	07 13 7 073 915	\$0.77
10	Cover, Sill Plate (Adhesive)¶				
	Base Model		R	51 71 7 052 127	\$38.63
			L	51 71 7 052 127	\$38.63
	S Model		R	51 71 7 200 469	\$56.36
			L	51 71 7 200 469	\$56.36
	John Cooper Works Model	09-1	R	51 47 7 208 267	\$56.36
			L	51 47 7 208 267	\$56.36
	¶Non-Reusable Part				
11	Support, Jack (2/Side)		R	51 71 7 039 760	\$15.47
			L	51 71 7 039 760	\$15.47



1 Trim, Center Pillar

Black 51 43 2 753 004 R #.3 \$40.52 #.3 51 43 2 753 003 \$40.52

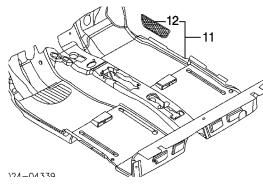
Gray	R	#.3	51 43 2 753 002	\$40.52
O. Osusan Osaskan Billion	L	#.3	51 43 2 753 001	\$40.52
2 Cover, Center Pillar	Б	<i>"</i> 0	E4 40 0 7E4 E46	C40.44
Black	R	#.3	51 43 2 754 516 51 43 2 754 515	\$10.11
0	L	#.3		\$10.11
Gray	R	#.3	51 43 2 754 514	\$10.11
O. Trime Description	L	#.3	51 43 2 754 513	\$10.11
3 Trim, Rear Pillar	ь	4 0	51 43 2 753 008	Ф40 F0
Black	R	#.3	51 43 2 753 008	\$40.52
Cray	L	#.3	51 43 2 753 007	\$40.52
Gray	R	#.3	51 43 2 753 006	\$40.52
	L	#.3	51 45 2 755 005	\$40.52
#w/Inner Quarter Trim Panel & Rear Seat Removed				
4 Cover, Pillar				
Black	R		51 43 2 753 024	\$0.47
	L		51 43 2 753 023	\$0.47
Gray	R		51 43 2 753 022	\$0.47
	L		51 43 2 753 021	\$0.47
5 Panel Assy, Inner Rocker				
Beige	R		.3 51 43 2 753 366	\$29.98
	L		.3 51 43 2 753 365	\$23.59
Black	R		.3 51 43 2 753 362	\$29.98
	L		.3 51 43 2 753 361	\$23.59
Gray	R		.3 51 43 2 753 364	\$29.98
•	L		.3 51 43 2 753 363	\$23.59
Red	R		.3 51 43 2 753 368	\$29.98
	L		.3 51 43 2 753 367	\$23.59
6 Cover, Fuse Block¶				
Beige	R		51 43 2 753 382	\$27.30
Black	R		51 43 2 753 378	\$27.30
Gray	R		51 43 2 753 380	\$27.30
Red	R		51 43 2 753 384	\$27.30
Clip, Retaining (a)¶	R		51 43 7 048 911	\$0.56
σ.μ.,	L		51 43 7 048 911	\$0.56
	_			*****
¶Included w/Inner Rocker Panel Assy				
(a) As Required				
7 Footrest, Side	L		51 47 7 149 471	\$32.28
8 Moulding, Rocker Panel-See Exterior Trim Section				

⁹ Cover, Sill Plate-See Exterior Trim Section

		51 76 7 151 384
10 W/Strip, Door Opening (On Body)	R	.5

L .5 51 76 7 151 383 \$74.54

\$74.54



 11 Carpet Assy, Floor
 51 47 9 181 159
 \$499.76

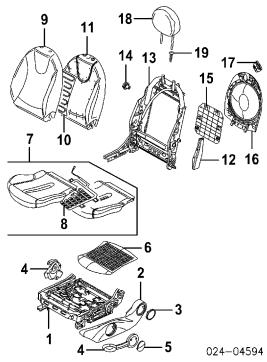
 12 Net, Storage (b)
 51 47 2 756 214
 \$37.84

(b) Included w/Floor Carpet Assy

Harness, Main Body 61 11 0 420 283 \$2,591.84

FRONT SEAT

PASSENGER SIDE

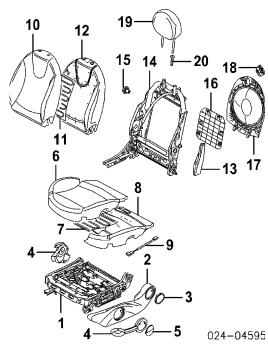


(a) Included w/Seat Cushion Assy

	. 021 01031					
	R&I Front Seat Assy			.4		
1	Frame, Seat Cushion					
	w/Height Adjustment		#1.8		52 10 2 751 248	\$575.39
	w/o Height Adjustment		#1.8		52 10 2 751 396	\$523.25
	#w/Seat Assy Removed					
	Bolt, Frame (2)				07 14 9 149 258	\$3.20
2	Cover, Outer Trim			.3	52 10 2 751 236	\$27.99
3	Cover, Hole				52 10 2 751 370	\$7.71
4	Lever, Adjuster	R			52 10 2 756 960	\$18.44
		L			52 10 2 752 672	\$21.97
5	Cover, Adjuster				52 10 2 751 367	\$8.21
6	Sensor, Occupant Detector-See Air Bag System Section					
	Plug, Switch				52 10 2 753 580	\$4.55
	Spring, Seat Cushion		#1.8		52 10 2 752 616	\$21.41
7	Cushion Assy, Seat					
	Cloth		#1.8		52 10 9 179 908	\$679.43
	Leather		#1.8		52 10 9 179 936	\$1,209.39
8	Heater, Seat Cushion (a)¶		#1.8		52 10 2 755 089	\$80.60

#R&R Complete, w/Seat Assy Removed, Includes R&R Seat Bottom Frame

	i raine			
9	Cover, Seat Back¶			
	Cloth	#1.4	52 10 2 753 488	\$273.60
	Leather	#1.4	52 10 9 165 414	\$601.95
10	Heater, Seat Back¶	#1.4	52 10 2 755 088	\$78.58
11	Pad, Seat Back¶	#1.4	52 10 2 751 382	\$124.57
	¶Order by Application			
12	Module, Seat Air Bag-See Air Bag System Section			
13	Frame, Seat Back	#1.4	52 10 2 753 614	\$289.68
14	Knob, Adjusting		52 10 2 751 387	\$13.02
15	Plate, Seat Back	#.4	52 10 2 755 073	\$55.36
	Spring, Seat Back	#1.4	52 10 2 752 614	\$76.55
16	Cover, Seat Back	#.2	52 10 7 225 522	\$119.68
	#R&R Complete, w/Seat Assy Removed			
17	Handle, Release		52 10 2 754 766	\$14.71
18	Headrest¶			
	Cloth	#.2	52 10 2 752 480	\$95.84
	Leather	#.2	52 10 7 229 675	\$156.97
	¶Order by Application			
	#Included in R&R Seat Back			
19	Guide, Headrest			
	Locking		52 10 2 751 383	\$10.50
	Non-Locking		52 10 2 752 637	\$10.50
	DRIVER SIDE			



9 Sensor, Seat Position-See Air Bag System Section

10 Cover, Seat Back¶

11 Heater, Seat Back¶

12 Pad, Seat Back¶

Cloth

Leather

R&I Front	Seat Assy				4	
1 Frame, Se	at Cushion			#1.8	52 10 2 751 247	\$575.39
#w/Seat As	ssy Removed					
Bolt, Fram	e (2)				07 14 9 149 258	\$3.20
2 Cover, Ou	ter Trim				3 52 10 2 751 235	\$27.99
3 Cover, Hol	le				52 10 2 751 370	\$7.71
4 Lever, Adj	uster		R		52 10 2 756 959	\$18.44
			L		52 10 2 752 672	\$21.97
5 Cover, Adj	uster				52 10 2 751 367	\$8.21
Plug, Swite	ch				52 10 2 753 580	\$4.55
Spring, Se	at Cushion			#1.8	52 10 2 752 616	\$21.41
6 Cover, Sea	at Cushion¶					
Cloth				#1.8	52 10 2 753 467	\$225.65
Leather				#1.8	52 10 7 229 557	\$568.67
7 Heater, Se	eat Cushion¶			#1.8	52 10 2 755 089	\$80.60
8 Pad, Seat	Cushion¶			#1.8	52 10 2 751 379	\$113.24
#R&R Con Frame	nplete, w/Seat Assy Remov	ved, Includes R&R Sea	at Botto	om		

52 10 2 753 487

52 10 9 165 413

52 10 2 755 089

52 10 2 751 381

\$273.60

\$601.95

\$124.57

\$80.60

#1.4

#1.4

#1.4

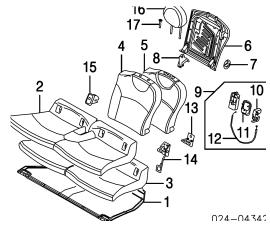
#1.4

¶Order by Application

13 Module, Seat Air Bag-See Air Bag System Section

14 Frame, Seat Back Spring, Seat Back	#1.4 #1.4	52 10 2 753 613 52 10 2 752 613	\$289.68 \$76.55
#R&R Complete, w/Seat Assy Removed			
15 Knob, Adjusting		52 10 2 751 387	\$13.02
16 Plate, Seat Back	#.4	52 10 2 755 073	\$55.36
17 Cover, Seat Back	#.2	52 10 7 225 521	\$119.68
18 Handle, Release		52 10 2 754 766	\$14.71
19 Headrest¶			
Cloth	#.2	52 10 2 752 480	\$95.84
Leather	#.2	52 10 7 229 675	\$156.97
¶Order by Application			
#Included in R&R Seat Back			
20 Guide, Headrest			
Locking		52 10 2 751 383	\$10.50
Non-Locking		52 10 2 752 637	\$10.50

REAR SEAT

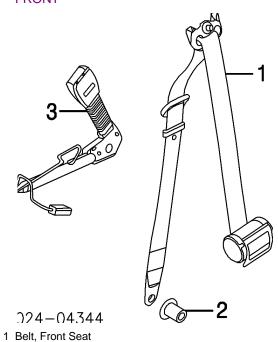


1	s			
R&I Rear Seat Assy (Complete)			.5	
1 Frame, Seat 2 Cover, Seat¶		#.8	52 20 2 751 374	\$65.30
Cloth		#.8	52 20 2 753 261	\$414.00
Leather		#.8	52 20 7 229 589	\$939.28
¶Black listed, Order by Application				
3 Pad, Seat		#.8	52 20 2 751 618	\$186.05
#R&R Complete, w/Rear Seat Assy Removed				
4 Cover, Seat Back¶				
Cloth	R	#1.0	52 20 2 753 274	\$102.50
	L	#1.0	52 20 2 753 273	\$102.50
Leather	R	#1.0	52 20 7 229 628	\$395.95
	L	#1.0	52 20 7 229 627	\$395.95
¶Black listed, Order by Application				
5 Pad, Seat Back	R	#1.0	52 20 2 751 254	\$120.39
	L	#1.0	52 20 2 751 253	\$120.39
6 Frame, Seat Back	R	#1.0	52 20 2 751 252	\$202.56
	L	#1.0	52 20 2 751 251	\$202.56
#R&R Complete, w/Rear Seat Assy Removed				
7 Spacer, Seat	R		52 10 2 752 602	\$1.58
	L		52 10 2 752 602	\$1.58
8 Mount, Rear Seat			52 20 2 751 377	\$30.84
9 Lever Assy, Seat	R		52 20 2 751 256	\$81.16
	L		52 20 2 751 256	\$81.16
10 Latch (a)	R		52 20 2 755 156	\$39.60

		L		52 20 2 755 155	\$39.60
11	Cover, Lever (a)	R		52 20 2 755 153	\$3.05
		L		52 20 2 755 153	\$3.05
12	Cable, Release (a)	R		52 20 2 755 154	\$11.20
		L		52 20 2 755 154	\$11.20
	(a) Included w/Seat Lever Assy				
13	Catch, Seat Back	R		52 20 2 751 363	\$13.10
		L		52 20 2 751 363	\$13.10
14	Striker, Latch	R		52 20 2 751 365	\$23.20
		L		52 20 2 751 365	\$23.20
15	Cover, Latch	R		52 20 9 178 248	\$13.14
		L		52 20 9 178 247	\$13.14
16	Headrest¶				
	Cloth	R	#.2	52 20 2 754 190	\$100.67
		L	#.2	52 20 2 754 190	\$100.67
	Leather	R	#.2	52 20 2 752 494	\$131.47
		L	#.2	52 20 2 752 494	\$131.47
	¶Order by Application				
	#Included in R&R Seat Back				
17	Guide, Headrest				
	Locking	R		52 10 2 751 383	\$10.50
		L		52 10 2 751 383	\$10.50
	Non-Locking	R		52 10 2 752 637	\$10.50
		L		52 10 2 752 637	\$10.50

SEAT BELTS

FRONT



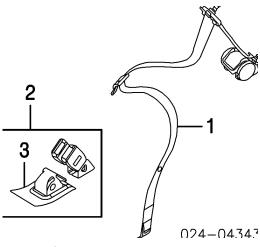
1 Belt, Front Seat R #1.2 72 11 2 751 228 \$76.37 L #1.2 72 11 2 751 227 \$76.37

#Includes R&I Center Pillar Trim & Quarter Trim Panel Assy, w/Rear Seat Assy Removed

Pretensioner, Seat Belt-Serviced w/Front Seat Belt

2 Bushing, Anchor Bolt	R	72 11 7 077 367	\$6.08
	L	.4 72 11 7 077 367	\$6.08
3 Buckle, Seat Belt	R	.4 72 11 7 211 592	\$128.70
	L	72 11 7 211 591	\$128.70

REAR



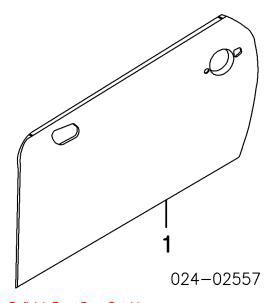
1 Belt, Rear Seat	R	#1.2	72 11 2 751 403	\$76.37
	L	#1.2	72 11 2 751 403	\$76.37
#Includes R&I Inner Pillar Trim Panel & Quarter	r Trim Panel Assy	′		
2 Buckle Assy, Seat Belt		#.2	72 11 2 752 698	\$32.27
#w/Rear Seat Assy Removed				
3 Cover, Buckle¶			72 11 7 116 359	\$8.99

¶Included w/Seat Belt Buckle Assy

FRONT DOOR

Procedures 16 and 28

SHEET METAL



R	et!	in	ish	F	ror	ηt	Dο	or	C)ut	s	de	Э

Add for Jambs & Interior

R&I Door Assy

Add to R&R Door

To R&I/R&R Side Impact Sensor

1 Shell, Door

#Includes R&I Mirror Assy EXTERIOR TRIM

R	2.0
L	2.0
R	1.0
L	1.0
R	1.0
L	1.0

R	.5
L	.5

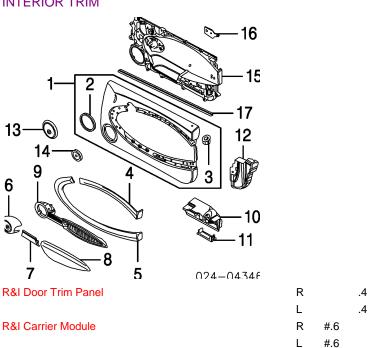
R	#5.2	41 00 2 755 936	\$383.16
L	#5.2	41 00 2 755 935	\$383.16

2 4				
)24-04345				
Refinish Mirror Cover	R		.5	
	L		.5	
R&I Outer Belt Moulding	R		.3	
	L		.3	
R&I Mirror Assy	R	#.8		
	L	#.8		
#Includes R&I Door Trim Panel				
1 Moulding, Outer Belt	R		.3 51 33 7 146 092	\$37.08
	L		.3 51 33 7 146 091	\$37.08
2 Mirror, Rear View				
w/Folding Mirror	R	#.6	51 16 2 755 640	\$231.47
	L	#.6	51 16 2 755 639	\$231.47
w/o Folding Mirror	R	#.6	51 16 2 755 636	\$122.98
	L	#.6	51 16 2 755 635	\$122.98
#w/Door Trim Panel Removed				
3 Glass, Mirror	R	#.2	51 16 2 755 630	\$77.13
	L	#.2	51 16 2 755 629	\$55.33
#Included in R&R Rear View Mirror				
4 Actuator, Mirror	R		67 13 2 755 622	\$60.12
	L		67 13 2 755 622	\$60.12
5 Cover, Mirror				
Chrome	R	#.2	51 16 2 753 670	\$115.92
	L	#.2	51 16 2 753 669	\$115.92
Carbon	R	#.2	51 16 0 415 374	\$279.00
	L	#.2	51 16 0 415 373	\$279.00

Checker	R	#.2	51 16 0 415 120	\$101.95
	L	#.2	51 16 0 415 117	\$101.95
Union Jack	R	#.2	51 16 0 415 118	\$101.95
	L	#.2	51 16 0 415 113	\$101.95
Paint to Match	R	#.2	51 16 2 754 914	\$40.74
	L	#.2	51 16 2 754 913	\$40.74

#Included in R&R Rear View Mirror

INTERIOR TRIM



#w/Door Glass Removed, Not Included in R&R Door Trim Panel, Does Not Include R&I Trim Panel

NOTE: All Parts in this section are included in R&R Trim Panel unless noted otherwise.

1 Panel Assy, Door Trim			
Beige	R	.5 51 41 2 753 302	\$187.68
	L	.5 51 41 2 753 301	\$187.68
Black	R	.5 51 41 2 753 298	\$187.68
	L	.5 51 41 2 753 297	\$187.68
Gray	R	.5 51 41 2 753 300	\$187.68
	L	.5 51 41 2 753 299	\$187.68
Red	R	.5 51 41 2 753 304	\$187.68
	L	.5 51 41 2 753 303	\$187.68
2 Seal, Speaker¶	R	51 41 2 756 523	\$7.02
	L	51 41 2 756 523	\$7.02
3 Cover, Lock Button¶	R	51 21 2 756 213	\$0.94

	L	51 21 2 756 213	\$0.94
¶Included w/Door Trim Panel Assy			
4 Panel, Upper Trim			
Black	R	51 41 7 222 136	\$124.33
Black	L	51 41 7 222 135	\$124.33
Brushed Alum	R	51 41 2 753 714	\$103.32
Diagnoa / Nam	L	51 41 2 753 713	\$103.32
Checker Flag	R	51 41 2 753 708	\$117.37
Choose Hag	L	51 41 2 753 707	\$117.37
Silver	07-0 R	51 41 2 753 710	\$103.32
	L	51 41 2 753 709	\$103.32
	09 R	51 41 7 233 922	\$109.76
	L	51 41 7 233 921	\$109.76
5 Panel, Lower Trim			,
Black	R	51 41 7 222 134	\$138.89
	L	51 41 7 222 133	\$143.79
Brushed Alum	R	51 41 2 753 704	\$120.65
	L	51 41 2 753 703	\$120.65
Checker Flag	R	51 41 2 753 698	\$135.57
Ç	L	51 41 2 753 697	\$135.57
Silver	07-0 R	51 41 2 753 700	\$120.65
	L	51 41 2 753 699	\$120.65
	09-1 R	51 41 7 233 920	\$128.06
	L	51 41 7 233 919	\$128.06
6 Cover, Speaker			
Std Sound System			
Chrome Trim	R	51 41 2 753 688	\$31.08
	L	51 41 2 753 693	\$31.08
Silver Trim	R	51 41 2 753 686	\$34.27
	L	51 41 2 753 691	\$34.27
Premium Sound System	R	51 41 2 756 570	\$33.60
	L	51 41 2 756 571	\$33.60
7 Insert, Door Trim			
Black	R	51 41 2 753 326	\$21.63
	L	51 41 2 753 325	\$21.63
Brushed Alum	R	51 41 2 753 328	\$66.62
	L	51 41 2 753 327	\$66.62
Oak	R	51 41 2 753 330	\$87.60
	L	51 41 2 753 329	\$87.60
8 Armrest (a)	R	51 41 2 753 320	\$78.00
	L	51 41 2 753 319	\$78.00
(a) Blue listed, Order by Application			
9 Bracket, Armrest	R	51 41 2 753 724	\$30.83

16 Bracket, Trim Panel

·				
	L		51 41 2 753 723	\$30.83
10 Insert, Panel-See Hardware Section				
	_		54 45 0 440 004	.
11 Cover, Opening	R		51 45 3 413 281	\$1.11
	L		51 45 3 413 281	\$1.11
12 Insert, Panel-See Hardware Section				
13 Cover, Speaker				
Std Sound System				
Chrome Trim	R		51 41 2 753 333	\$35.30
	L		51 41 2 753 333	\$35.30
Silver Trim	R		51 41 2 753 270	\$30.02
	L		51 41 2 753 270	\$30.02
Premium Sound System	R		51 41 2 756 567	\$37.17
	L		51 41 2 756 567	\$37.17
Speaker				
Tweeter	R	#.2	65 13 3 422 640	\$43.57
	L	#.2	65 13 3 422 640	\$43.57
Mid-Range				
Std Sound System	R	#.2	65 13 3 428 196	\$48.80
	L	#.2	65 13 3 428 196	\$48.80
Premium Sound System	R	#.2	65 13 9 143 153	\$49.00
	L	#.2	65 13 9 143 153	\$49.00
Woofer				
Std Sound System	R	#.2	65 12 3 450 757	\$50.80
	L	#.2	65 12 3 450 757	\$50.80
Premium Sound System	R	#.2	65 13 3 422 637	\$98.68
	L	#.2	65 13 3 422 637	\$98.68
#w/Door Trim Panel Removed, Included in R&R Carrier Panel	Module,	Not Inclu	uded in R&R Door Trin	n
14 Bezel, Inside Handle-See Hardware Section				
,				
15 Carrier, Module				
Beige	R	#1.7	51 41 7 241 004	\$344.21
	L	#1.7	51 41 7 241 003	\$344.21
Black	R	#1.7	51 41 7 241 002	\$344.21
	L	#1.7	51 41 7 241 001	\$344.21
Gray	R	#1.7	51 41 2 753 678	\$351.86
	L	#1.7	51 41 2 753 677	\$351.86
Red	R	#1.7	51 41 7 241 006	\$344.21
	L	#1.7	51 41 7 241 005	\$344.21
#w/Door Glass Removed, Includes R&R Speaker, Not In	ncluded i	n R&R T	rim Panel	

R

51 41 2 755 299

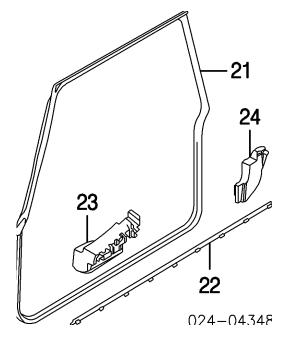
\$4.32

17 Moulding, Inner Belt	L R L		51 41 2 755 299 51 33 7 146 090 51 33 7 146 089	\$4.32 \$33.05 \$33.05
HARDWARE	_			******
5 6 7 9 14 15 4 7 9 10 11 1 2 13 18 17 024-0436	3			
Refinish Upper Door Hinge	R		5	
Refinish Lower Door Hinge	L R			
	L		5	
R&I Outside Handle	R L	#1.1 #1.1		
#Includes R&I Carrier Module				
1 Latch, Door	R	#.4	51 21 2 752 596	\$135.83
	L	#.4	51 21 2 752 595	\$135.83
#w/Carrier Module Removed				
2 Striker, Latch				
2007-08	R	-	2 51 21 7 010 402	\$17.27
200	L	•	2 51 21 7 010 402	\$17.27
To 7-09	R		2 51 21 7 010 402	\$17.27
	L	.:	2 51 21 7 010 402	\$17.27
From 7-09	R		2 51 21 7 202 485	\$17.27
	L		2 51 21 7 202 485	\$17.27
20	10 R		2 51 21 7 202 485	\$17.27
	L	.:	2 51 21 7 202 485	\$17.27
3 Gasket, Striker	R		51 21 7 042 375	\$1.00
	L		51 21 7 042 375	\$1.00
4 Rod, Lock	R		51 21 7 148 186	\$3.57
	L		51 21 7 148 185	\$3.57
5 Cylinder, Lock	L		51 21 7 074 440	\$87.56
¶Order by Application				

6	Handle, Outside				
Ū	w/Comfort Access	R	#.5	51 21 2 752 578	\$89.45
		L	#.5	51 21 2 752 577	\$89.45
	w/o Comfort Access	R	#.5	51 21 7 198 472	\$49.66
		L	#.5	51 21 7 198 471	\$49.66
	#w/Carrier Module Removed				
7	Bracket, Front Handle	R		51 21 7 040 550	\$2.57
•	Practice, Front Flandic	L		51 21 7 040 550	\$2.57
8	Bracket, Rear Handle	R		51 21 7 040 549	\$2.63
Ū		L		51 21 7 040 549	\$2.63
9	Bracket, Cable	R		51 21 7 040 548	\$13.90
		L		51 21 7 040 548	\$13.90
10	Cable, Inside Handle	R		51 21 2 754 525	\$14.02
		L		51 21 2 754 525	\$14.02
11	Connector, Cable	R		51 21 1 499 780	\$7.87
		L		51 21 1 499 779	\$7.87
12	Handle, Inside Door	R	#.3	51 21 2 753 718	\$38.83
		L	#.3	51 21 2 753 717	\$38.83
	#w/Speaker Removed				
13	Bezel, Inside Handle				
	Chrome Trim	R		51 41 2 753 340	\$9.63
		L		51 41 2 753 339	\$9.63
	Silver Trim	R		51 41 2 753 338	\$9.63
		L		51 41 2 753 337	\$9.63
14	Hinge, Upper Door	R	#.5	41 00 7 040 188	\$34.65
		L	#.5	41 00 7 040 187	\$34.65
	#w/Door Assy Removed				
15	Spacer, Upper	_		44 = 4 = 4 = 0 = 0 = 4	
	.5mm	R		41 51 8 173 321	\$3.15
		L		41 51 8 173 321	\$3.15
	1.0mm	R		41 51 7 202 047	\$3.15
40	ur i B	L	" •	41 51 7 202 047	\$3.15
16	Hinge, Lower Door	R	#.6	41 51 7 176 820	\$34.65
	#w/Front Door Removed	L	#.6	41 51 7 176 819	\$34.65
17	Spacer, Lower				
17	.5mm	R		41 51 8 173 321	\$3.15
		L		41 51 8 173 321	\$3.15 \$3.15
	1.0mm	R		41 51 7 202 047	\$3.15
		L		41 51 7 202 047	\$3.15
18	Check, Door	R	#.2	51 21 4 445 522	\$60.82
. •		L	#.2	51 21 4 445 522	\$60.82

#w/Door Trim Panel Assy & Speaker Removed

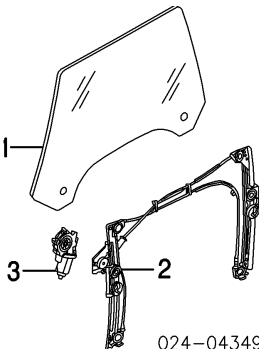
19 Gasket, Door Check	R	51 21 7 127 229	\$7.70
	L	51 21 7 127 229	\$7.70
20 Seal, Door Check	R	51 21 7 135 289	\$7.70
	L	51 21 7 135 289	\$7.70



21 W/Strip, Door Opening-See Rocker/Pillars/Floor Section

22 Seal, Door	R	.2 51 76 7 146 093	\$15.70
	L	.2 51 76 7 146 093	\$15.70
Insert, Panel			
23 Front	R	51 41 2 755 654	\$18.42
	L	51 41 2 755 653	\$18.42
24 Lower	R	51 71 2 755 652	\$12.67
	L	51 71 2 755 651	\$12.67
Harness, Door¶	R	61 12 6 915 576	\$91.97
	L	61 12 1 513 381	\$91.97

¶Order by Application GLASS & PARTS



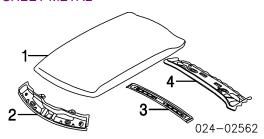
1 Glass, Door				
Mini	R		1.0 51 33 7 147 396	\$77.54
	L		1.0 51 33 7 147 395	\$77.54
NAGS	R		1.0 FD23562GTN	\$247.05
	L		1.0 FD23563GTN	\$247.05
2 Regulator, Window	R	#.3	51 33 2 756 084	\$172.80
	L	#.3	51 33 2 756 083	\$172.80
#w/Module Removed				
3 Motor, Regulator	R	#.3	67 62 2 755 854	\$110.27
	L	#.3	67 62 2 755 853	\$110.27

#w/Door Trim Panel Assy Removed

ROOF

Procedures 17 and 28

SHEET METAL



Refinish Roof Outside	
Add to P&P Poof	

To R&I/R&R Side Curtain Air Bags

R&I Antenna

1 Panel, Roof w/Sunroof

w/o Sunroof 2 Panel, Front Header

3 Reinf, Roof 4 Panel, Rear Roof

EXTERIOR TRIM



1.8 .3

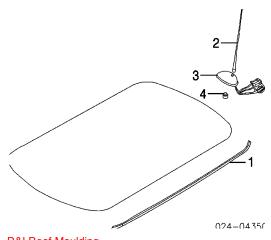
3.0

19.0 41 31 2 756 574	
17.5 41 31 2 756 573	
2.0. 41.32.7.066.802	

\$889.81 \$808.92 \$57.24

1.0 41 23 7 035 275 2.0 41 32 7 175 158

\$50.38 \$94.65



R&I Roof Moulding

1 Moulding, Side Roof

2 Mast, Antenna w/Navigation System w/o Navigation System R L

.4 51 13 7 146 106 R

.4

.4 51 13 7 146 105

\$59.17 \$59.17

65 20 3 453 893

\$23.97

65 20 3 451 575 \$23.97

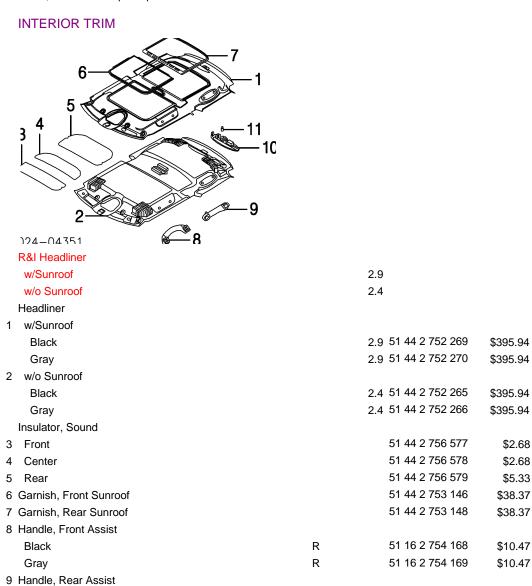
3 Base, Antenna

w/Navigation System	#1.6	65 20 3 442 169	\$273.33
w/o Navigation System	#1.6	65 20 3 442 105	\$35.81
#Includes Drop Rear Section of Headliner to Gain Access			
4 Next Antonna		65 20 3 442 253	<u></u>
4 Nut, Antenna		00 20 3 442 203	\$3.78

Decal, Roof-See Stripe Tape Section

Black

Gray



R

R

L

51 44 2 753 144

51 44 2 753 143

51 44 2 753 142

51 44 2 753 141

\$8.95

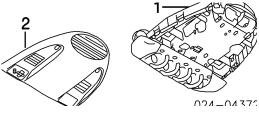
\$8.95

\$8.95

\$8.95

10 Lamp, Dome	.3 63 31 2 754 520	\$76.55
11 Bulb, Lamp	63 21 7 160 908	\$8.14

OVERHEAD CONSOLE

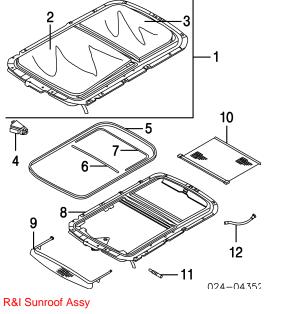


R&I Control Panel	.4
R&I Control Panel	.4

Rai Cultiul Fallel		.4	
1 Panel, Control			
w/Sunroof			
w/Light Pkg		.4 61 31 3 422 626	\$192.53
w/o Light Pkg		.4 61 31 3 455 631	\$192.53
w/o Sunroof			
w/Light Pkg		.4 61 31 3 422 625	\$192.53
w/o Light Pkg		.4 61 31 3 455 630	\$192.53
2 Cover, Panel¶			
Black	#.1	61 31 3 422 628	\$16.57
Gray	#.1	61 31 3 422 627	\$16.57
¶Order by Application			

#Included in R&R Control Panel

SUNROOF



O/H Sunroof Assy (Includes R&I)

#3.5

#1.5

#w/Headliner Removed

NOTE: All Parts in this section are included in overhaul unless noted otherwise.

1	Panel Assy, Sunroof #w/Headliner Removed	#1.5	54 10 2 758 293	\$1,300.03
2	Glass, Front Sunroof¶		.5 54 10 2 751 803	\$478.44
3	Glass, Rear Sunroof¶		.5 54 10 2 751 804	\$334.89
	¶Included w/Sunroof Panel Assy			
4	Motor, Sunroof	#.6	54 10 3 448 675	\$316.19
	#w/Control Panel Removed			
	Switch, Sunroof		N.A.	
5	Seal, Sunroof		54 10 7 210 652	\$17.59
6	Seal, Glass Front		54 10 2 755 851	\$10.31
7	Seal, Glass Rear		54 10 2 755 852	\$34.32
8	Frame, Sunroof	IOH	54 10 2 758 294	\$781.54
9	Deflector, Air		.3 54 10 2 755 850	\$80.49
10	Blind, Sunroof			
	Front	#.4	54 10 2 757 016	\$262.44
	#w/Front and Rear Sunroof Glass Removed			
	Rear	#.4	54 10 2 755 849	\$113.77

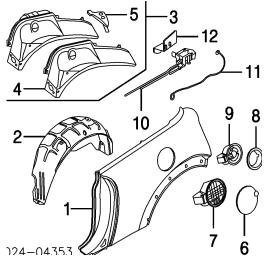
#w/Rear Sunroof Glass Removed

11 Hose, Front Drain	51 73 8 197 504	\$2.43
12 Hose, Rear Drain	54 10 7 043 425	\$4.56

QUARTER PANEL

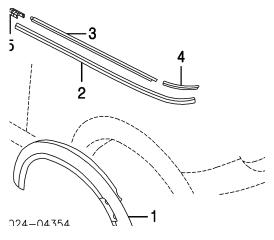
Procedures 20 and 28

SHEET METAL



124-04.35.3		
Refinish Quarter Panel Outside	R	2.0
	L	2.0
Add to Edge Panel	R	.5
Add for Pillar	L R	.5 .5
Add for Fillal	L	.5 .5
Add for Inside	R	.8
	L	.8
Refinish Fuel Filler Door	L	#.5
#Included in Refinish Left Quarter Panel Outside		
Add for Inside	L	.2
Refinish Housing Cover		.5
R&R Both Quarter Panels		24.0
R&R Rear Body Panel & Both Quarters		26.5
Add to R&R Quarter Panel		
To R&I/R&R Side Curtain Air Bag	R	#.3
	L	#.3
#Includes R&I/R&R Center Air Bag Sensor		
R&I Quarter Glass	R	.2
	- 1	2

Add to R&R Quarter Panel w/Mudguard	R	.2		
	L	.2		
1 Panel, Side Quarter	R	16.2	41 00 7 230 554	\$418.08
	L	15.7	41 00 7 230 553	\$418.08
2 Liner, Quarter Panel	R	.3	51 71 7 136 168	\$82.72
	L	.3	51 71 7 136 167	\$82.72
3 Panel Assy, Outer Wheelhouse	R	3.0	41 00 2 755 200	\$79.70
	L	3.0	41 00 2 755 199	\$79.70
4 Panel, Whihse¶	R	2.5	41 14 2 754 654	\$81.40
	L	2.5	41 14 2 754 653	\$81.40
5 Cover, Whihse¶	R	.4	41 14 7 035 346	\$17.68
	L	.4	41 14 7 035 345	\$17.68
¶Included w/Outer Wheelhouse Panel Assy				
6 Door, Fuel Filler				
Base Model	L	.3	51 17 7 148 883	\$17.27
7 Cover, Housing			54 47 7 440 004	.
Base Model	L		51 17 7 148 884	\$41.87
8 Cover, Housing (P)			E4 47 0 7E4 0E0	
S Model, John Cooper Works Model	L		51 17 2 754 659	\$11.55
(P) Paint to Match				
9 Housing, Fuel Door				
S Model, John Cooper Works Model	L		51 17 7 148 886	\$12.70
10 Actuator, Fuel Door Release			67 11 6 985 880	\$60.12
11 Release, Emergency			51 25 7 131 748	\$3.72
12 Bracket, Actuator			41 35 2 752 429	\$5.52
EXTERIOR TRIM				



	Refinish Wheel Opening Moulding	R	.8	
		L	.8	
	R&I Wheel Opening Moulding	R	.3	
		L	.3	
	Add to R&I/R&R Wheel Opening Moulding			
	w/Mudguard	R	.2	
	· ·	L	.2	
	R&I Mudguard	R	.2	
		L	.2	
	R&R Mudguard	R	.2	
		L	.2	
1	Moulding, Wheel Opening			
	2007-08	R	.3 51 77 2 751 322	\$63.18
		L	.3 51 77 2 751 321	\$63.18
	2009-10 (P)	R	.3 51 77 7 216 070	\$90.27
		L	.3 51 77 7 216 069	\$90.27
	(P) Paint to Match			
2	Moulding, Upper	R	.3 51 37 2 756 102	\$33.28
		L	.3 51 37 2 756 101	\$33.28
	Bracket, Moulding			
3	Front	R	51 37 2 754 857	\$13.47
		L	51 37 2 754 857	\$13.47
4	Rear	R	51 37 2 754 776	\$3.18
		L	51 37 2 754 775	\$3.18
	Lamp, Side Marker-See Rear Lamps Section			
5	Clip, Moulding (a)	R	51 37 2 756 103	\$1.00
		L	51 37 2 756 103	\$1.00

Premium Sound System

Tweeter

2010 Mini Cooper S Hatchback				
(a) Non-Reusable Part Mudguard Set¶				
Base Model		#	82 16 0 415 115	\$38.50
S Model		#	82 16 0 415 116	\$38.50
John Cooper Works Model ¶Set of 2	09-1	#	82 16 0 415 116	\$38.50
#See Headnotes for Labor Time				
INTERIOR TRIM				
3 4 5 6 6 7 7 7 5				
1 Panel Assy, Quarter Trim	R	#.4	51 43 2 756 052	\$438.05
Beige	L	#. 4 #.4	51 43 2 756 051	\$438.05
Black	R	#.4	51 43 2 756 048	\$438.05
Black	L	#.4	51 43 2 756 047	\$438.05
Gray	R	#.4	51 43 2 756 050	\$438.05
•	L	#.4	51 43 2 756 049	\$438.05
Red	R	#.4	51 43 2 756 054	\$438.05
	L	#.4	51 43 2 756 053	\$438.05
#w/Rear Seat Assy Removed				
2 Cover, Speaker¶	R		51 43 2 754 988	\$33.60
	L		51 43 2 754 987	\$33.60
¶Included w/Quarter Trim Panel Assy				
3 Speaker, Radio				
Bass				
Std Sound System	R	#.2	65 13 3 422 633	\$50.25

65 13 3 422 633

65 13 3 422 636

65 13 3 422 636

65 13 2 422 639

\$50.25

\$60.02

\$60.02

#.2

#.2

#.2

#.2

L

R

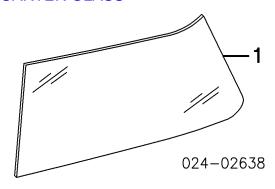
L

R

	L #.2	65 13 2 422 639	
#w/Quarter Trim Panel Assy Removed			
4 Seal, Speaker Hole	R	51 43 2 756 338	\$0.76
	L	51 43 2 756 338	\$0.76
5 Panel, Trim (a)	R	51 43 2 753 638	\$102.49
	L	51 43 2 753 637	\$102.49
(a) Order by Application			
6 Amplifier, Stereo	#.3	65 12 3 454 362	\$472.52
7 Bracket, Amplifier	#.3	65 12 2 753 430	\$11.94
Harness, Wiring		N.A.	

#w/Left Quarter Trim Panel Assy Removed

QUARTER GLASS



R&I Quarter Glass R #2.4 L #2.4

#Includes Clean Up Old Adhesive as Necessary

1 Glass, Quarter

Mini	R	#2.2	51 37 7 146 500	\$105.57
	L	#2.2	51 37 7 146 499	\$105.57
NAGS	R	#2.2	FQ23564GTN	\$770.15
	L	#2.2	FQ23565GTN	\$770.15

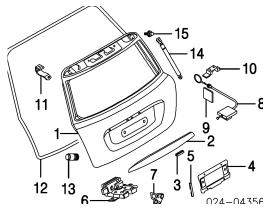
#Includes Clean Up Old Adhesive as Necessary

Adhesive, Glass N.A.

LIFTGATE

Procedures 25 and 28

SHEET METAL



Refinish Liftgate Outside			2.4
Add for Underside			1.2
Add for 2 Tone			.5
Refinish Liftgate Handle			.5
Refinish Liftgate Hinge	R		.5
	L		.5
R&I Liftgate			.8
Add to R&R Liftgate			
To Transfer Glass			.8
To R&I Rear Spoiler			.6
R&I Liftgate Handle Assy		#.6	

#Includes R&I Lower Trim Panel

1 Shell, Liftgate		3.8 41 00 2 752 015	\$447.46
2 Handle, Liftgate			
Chrome	#.3	51 13 2 753 603	\$97.33
Carbon	#.3	51 13 0 415 377	\$309.00
Body Color¶	#.3	51 13 0 430 312	\$196.21
Paint to Match	#.3	51 13 2 754 240	\$100.28
¶Order by Color			

"Graci by Gold.

#w/Lower Trim Panel Removed

Lamp, License-Serviced w/Liftgate Handle

3 Lens, License Lamp-See Rear Lamps Section

4 Brkt, License Plate		51 18 7 160 607	\$18.63
5 Seal, License Plate Brkt (2)		51 18 1 944 116	\$0.83
6 Latch, Liftgate	#.3	51 24 2 754 528	\$50.50

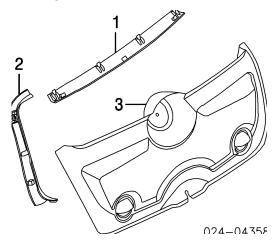
¶Order by Color 2 Clip, Spoiler (3)

	#w/Trunk Trim Panel Removed, Not Included in R&R Liftgate				
7	Striker, Latch		#.2	51 24 7 154 735	\$8.08
	#w/Lower Trim Panel Removed				
8	Release, Emergency			51 24 7 069 310	\$36.08
9	Pad, Anti-Rattle			51 24 7 117 729	\$1.02
10	Bracket, Cable			41 12 7 118 157	\$2.27
11	Hinge, Liftgate	R	#.3	41 62 2 754 282	\$46.50
		L	#.3	41 62 2 754 281	\$46.50
	#w/Liftgate & Headliner Removed				
12	W/Strip, Liftgate (On Body)			.4 51 71 7 132 471	\$69.98
	Bumper, Liftgate	R		.2 51 24 7 132 829	\$2.19
		L		.2 51 24 7 132 829	\$2.19
14	Strut, Liftgate	R	#.2	51 24 7 148 902	\$34.96
		L	#.2	51 24 7 148 902	\$34.96
	#w/Liftgate Removed .1				
15	Pin, Ball	R		07 14 7 202 359	\$1.21
		L		07 14 7 202 359	\$1.21
	EXTERIOR TRIM				
1	Refinish Rear Spoiler R&I Rear Spoiler Spoiler, Rear Base Model Body Color¶			1.5 .6	
	Paint to Match S Model, John Cooper Works Model			.6 51 62 2 753 757	\$264.95
	•			0 54 60 0 750 750	# 000 05
	Body Color¶			.6 51 62 2 753 758	\$282.95
	Paint to Match			.6 51 62 0 430 316	

07 14 7 141 218

\$0.53

3 Plug, Hole (4)		07 14 7 140 850	\$0.19
Harness, Wiring		N.A.	
4 Moulding, Liftgate		.2 51 31 2 754 852	\$20.51
5 Clip, Moulding		51 31 2 754 853	\$20.51
6 Emblem (Adhesive)		.2 51 14 7 026 186	\$25.32
Nameplate (Adhesive)			
7 "COOPER"		.2 51 14 7 026 186	\$25.32
8 "COOPER S"		.2 51 14 2 755 618	\$36.67
9 "JOHN COOPER WORKS"	09-1	.2 51 14 7 207 930	\$71.95
INTERIOR TRIM			



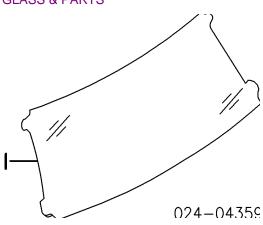
R&I Lower Trim Pane	R&I	Lower	Trim	Panel
---------------------	-----	-------	------	-------

R&I Lower Trim Panel		.3	
1 Panel, Upper Trim		.2 51 49 7 148 908	\$9.63
2 Panel, Side Trim	R	.2 51 49 7 148 910	\$7.19
	L	.2 51 49 7 148 909	\$7.19
3 Panel, Lower Trim		.3 51 49 7 148 904	\$87.73

61 11 9 140 785

\$431.00

Harness, Liftgate¶ ¶Order by Application **GLASS & PARTS**



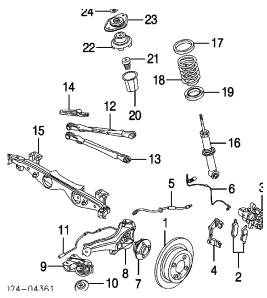
1 Glass, Liftgate

Mini NAGS	#2.0 #2.0	51 31 7 148 915 FB23566GTY	\$302.83 \$550.15
#Includes Clean Up Old Adhesive as Necessary			
Adhesive WIPER SYSTEM 5 7 4 1 2 6 6 6 6 7 7 7 7 7 7 7 7 7		N.A.	
1 Arm, Wiper	#.2	61 62 2 754 287	\$27.02
#Includes R&R Wiper Blade Assy or Insert			
2 Cover, Wiper Arm3 Blade Assy, Wiper4 Insert, Wiper¶¶Included w/Wiper Blade Assy	-	61 62 7 129 282 1 61 62 2 754 285 1 61 62 2 754 288	\$5.03 \$16.60 \$6.02
5 Motor Assy, Wiper	#.4	67 63 6 932 013	\$151.38
#w/Lower Trim Panel Removed, Includes R&I/R&R Wiper Arm, I	ncluded in	R&R Liftgate	
6 Bolt, Mounting (3) (a)		07 11 9 904 042	\$0.69
(a) Included w/Wiper Motor Assy			
7 Bearing, Motor8 Valve, Check9 Hose, Washer (b)(b) Cut to FitNozzle, Washer		61 62 7 129 283 61 68 8 229 249 N.A.	\$1.53 \$2.28

REAR SUSPENSION

Procedure 23

2007-09



124-04361		
R&I Suspension (One Side)	R	2.0
	L	2.0
O/H Suspension (Includes R&I)		
One Side (Includes R&I)	R	4.2
	L	4.2
Both Sides (Includes R&I)		8.0
Adjust Four Wheel Alignment		2.0
Adjust Rear Alignment		1.0
Bleed System		.6

NOTE 1: R&I/R&R or O/H Does Not include alignment or bleed brake system.

NOTE 2: All Parts in this section are included in overhaul unless noted otherwise.

1 Rotor, Brake				
Base, S Model	R	#.6	34 21 6 774 987	\$64.57
	L	#.6	34 21 6 774 987	\$64.57
John Cooper Works Model	09-1 R	#.6	34 21 6 784 389	\$69.80
	L	#.6	34 21 6 784 389	\$69.80
#R&R Both Sides 1.0				
2 Pad Set, Brake				
Base Model				

2010

34 21 6 778 327

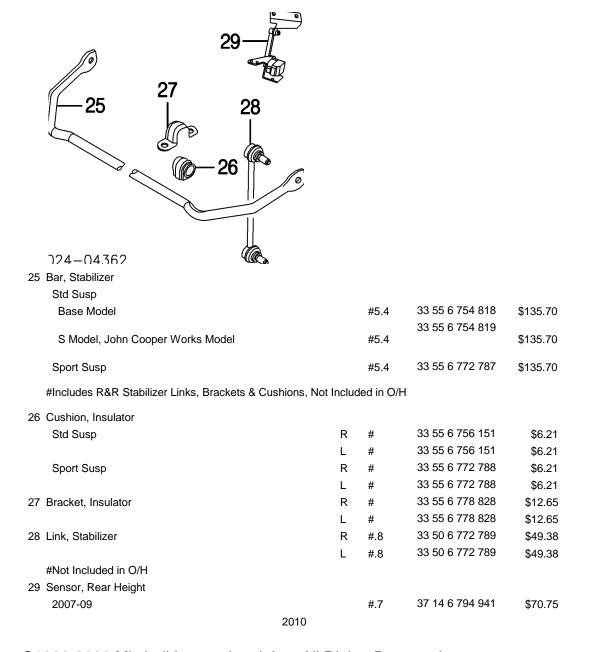
\$97.48

	To 9-09 From 9-09				34 21 6 778 327 34 21 6 794 059 34 21 6 778 327	\$97.48 \$94.65
	S Model, John Cooper Works Model			#1.0	34210770327	\$97.48
	#Deduct .5 for Each Caliper Removed					
3	Caliper, Brake					
	Base, S Model		R	#.5	34 21 6 785 612	\$254.69
			L	#.5	34 21 6 785 611	\$254.69
	John Cooper Works Model	09-1	R	#.5	34 21 6 784 646	\$293.87
			L	#.5	34 21 6 784 645	\$293.87
4	Bracket, Caliper		_		04040 === 00=	•
	Base, S Model		R	#.5	34 21 6 776 927	\$126.24
			L	#.5	34 21 6 776 927	\$126.24
	John Cooper Works Model	09-1	R	#.5	34 20 6 780 863	\$106.95
			L	#.5	34 20 6 780 863	\$106.95
	#R&R One Side Complete, R&R Both Sides .8					
5	Hose, Brake		R	#.3	34 30 6 781 667	\$39.24
			L	#.3	34 30 6 781 667	\$39.24
	#w/Caliper Removed Deduct .2					
6	Sensor, Brake Pad Wear		R		34 35 6 789 330	\$26.62
			L		34 35 6 789 330	\$26.62
7	Hub/Bearing		R	#1.0	33 41 6 786 620	\$224.49
			L	#1.0	33 41 6 786 620	\$224.49
	#Includes R&R Rotor, R&R Both Sides 1.8					
	Shield, Splash					
	Base Model		R		34 20 6 785 760	
			L		34 20 6 785 759	
8	Arm, Trailing					
	2007-09		R	#2.3	33 32 6 795 660	\$343.16
		0040	L	#2.3	33 32 6 795 659	\$343.16
	T- 40 00	2010	Ь	#O O	22 22 6 705 660	#242.40
	To 10-09		R L	#2.3 #2.3	33 32 6 795 660 33 32 6 795 659	\$343.16
	From 10-09		R	#2.3	33 32 6 795 660	\$343.16 \$343.16
	11011110-09		L	#2.3	33 32 6 795 659	\$343.16
	W. I. I. BODD: 111 (5 1 2 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7					ψυτυ. 10
	#Includes R&R Rotor, Hub w/Bearing & Trailing	Arm Bracke	et, R&	R Both Si	des 4.4	
9	Bracket, Trailing Arm		R	#1.6	33 30 6 772 666	\$48.33

	L	#1.6	33 30 6 772 665	\$48.33
#Included in R&R Trailing Arm				
#Included in R&R Trailing Affi				
10 Spacer, Mounting	R		33 31 6 761 779	\$3.56
	L		33 31 6 761 779	\$3.56
44 Conser Dear Wheel Creed Cos ADC/Drakes Costion				
11 Sensor, Rear Wheel Speed-See ABS/Brakes Section				
12 Arm, Upper	R	#1.2	33 32 6 768 724	\$144.33
7-11-1	L	#1.2	33 32 6 768 724	\$144.33
#w/Trailing Arm Removed Deduct .6, R&R Both Sides 2.2				
13 Arm, Lower	R	#1.2	33 32 6 768 726	\$172.86
	L	#1.2	33 32 6 768 726	\$172.86
#w/Tweilier Aven Democrat Deduct C DOD Deth Cides 2.2				
#w/Trailing Arm Removed Deduct .6, R&R Both Sides 2.2				
14 Stop, Bumper	R		33 32 6 774 032	\$5.68
Tr Gtop, Bampon	L		33 32 6 774 032	\$5.68
15 Carrier, Rear Axle	_	#5.4	33 31 6 772 667	\$449.51
				,
#Includes R&R Stabilizer Bar, Not Included in O/H				
4C Abasilar Charle				
16 Absorber, Shock Std Susp				
Base Model	R	#1.0	33 52 6 782 214	\$101.62
Date Model	L	#1.0	33 52 6 782 213	\$101.62
	_	<i>"</i> 1.0	33 52 6 782 216	Ψ101.02
S Model, John Cooper Works Model	R	#1.0		\$101.62
	L	#1.0	33 52 6 782 215	\$101.62
Sport Susp	R	#1.0	33 52 6 782 218	\$111.78
opon cuop	L	#1.0	33 52 6 782 217	\$111.78
17 Pad, Upper Spring	R	#1.0	33 53 1 495 714	\$8.50
7 11 1 3	L	#1.0	33 53 1 495 714	\$8.50
18 Spring, Coil	R	#1.0	33 53 6 756 658	\$140.33
	L	#1.0	33 53 6 756 658	\$140.33
19 Pad, Lower Spring	R	#1.0	33 50 6 772 790	\$2.57
	L	#1.0	33 50 6 772 790	\$2.57
20 Protector, Shock	R	#1.0	33 53 1 507 254	\$6.28
	L	#1.0	33 53 1 507 254	\$6.28
21 Cushion, Shock				
Std Susp	R	#1.0	33 53 6 772 740	\$15.68
	L	#1.0	33 53 6 772 740	\$15.68
Sport Susp				
	R	#1.0	33 53 6 772 786	\$15.68
Sport Guop	R L	#1.0 #1.0	33 53 6 772 786 33 53 6 772 786	\$15.68 \$15.68

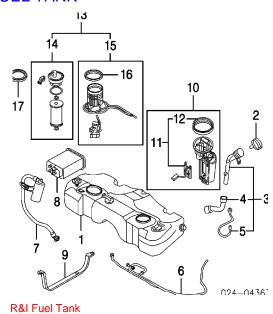
22 Plate, Upper Spring	R	#1.0	33 53 1 508 011	\$7.93
	L	#1.0	33 53 1 508 011	\$7.93
23 Guide, Upper	R	#1.0	33 52 6 754 124	\$91.43
	L	#1.0	33 52 6 754 124	\$91.43
24 Spacer, Upper	R	#1.0	33 52 6 776 759	\$2.04
	L	#1.0	33 52 6 776 759	\$2.04

#R&R One Side Complete, R&R Both Sides 1.8



To 10-09	#.7	37 14 6 794 941	\$70.75
From 10-09	#.7	37 14 6 794 941	\$70.75
#Not Included in O/H			

FUEL TANK



#w/Exhaust System Removed

NOTE: R&I/R&R Does Not include drain and refill.

1	Tank, Fuel	#4.0	16 11 2 752 299	\$388.83
	#w/Exhaust System Removed			
2	Cap, Fuel Filler			
	2007-09		16 11 7 222 391	\$18.93
	2010)		
	To 3-10		16 11 7 222 391	\$18.93
	From 3-10		16 11 7 222 391	\$18.93
3	Pipe Assy, Filler		16 11 2 755 569	\$100.80
4	Hose, Filler (a)		16 14 2 752 324	\$27.07
5	Strap, Ground (a)		16 14 2 757 537	\$15.80
	(a) Included w/Filler Pipe Assy			
6	Line, Fuel		16 12 2 752 553	\$32.15
7	Hose, Vent-See Emission System Section			
8	Canister, Carbon-See Emission System Section			
9	Strap, Fuel Tank	R	16 13 6 765 008	\$27.55
	•	L	16 13 6 765 008	\$27.55

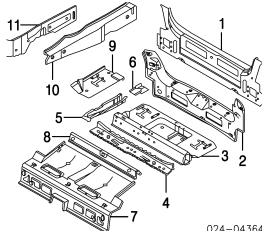
#3.2

10	Pump Assy, Fuel Base Model		#1.8	16 11 2 755 083	\$281.29
	S Model, John Cooper Works Model		#1.8	16 11 2 755 082	\$281.29
	#w/Rear Seat Assy Removed, Included in R&R Fuel Ta	ank			
11	Sensor Assy, Left Level (b)	L		16 14 2 754 862	\$61.93
12	Seal (b) (c)	L		16 11 1 184 084	\$18.77
	(b) Included w/Fuel Pump Assy				
	(c) Included w/Left Level Sensor Assy				
13	Sensor Assy, Right Level				
	Base Model	R	#2.4	16 11 2 755 085	\$221.62
	S Model	R	#2.4	16 11 2 755 084	\$221.62
	John Cooper Works Model	09-1 R	#2.4	16 11 2 755 084	\$221.62
	#w/Rear Seat Assy Removed, Included in R&R Fuel Ta	ank, R&R	Both Side	es 2.9	
14	Filter, Fuel (d)	R		11 25 2 754 870	\$50.71
15	Sensor Assy, Level (d)	R		16 14 2 754 869	\$96.35
16	Seal (d) (e)	R		16 11 1 184 084	\$18.77
	(d) Included w/Right Level Sensor Assy				
	(e) Included w/Level Sensor Assy				
17	Cap, Fuel Level			16 11 6 762 417	\$4.60

REAR BODY

Procedures 26 and 28

SHEET METAL



Refinish Rear Outer Panel		2.0
Add for Edge & Inside		1.0
Refinish Floor Panel		1.0
Add for Underside		.8
Section Axle Support	R	4.0
	L	4.0
1 Panel, Rear Outer		#7.5

#Deduct 2.5 for Each Quarter Panel Removed, Deduction Includes Common Surfaces & Included Operations

41 34 7 035 360

\$139.13

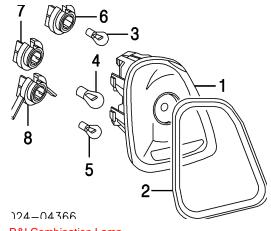
Striker, Latch-See Liftgate Section

2	Reinf, Rear Body		2.5	41 34 7 0	35 359	\$215.06
3	Floor, Trunk		#8.5	41 34 7 (75 491	\$416.68
	#w/Outer Rear Panel Removed					
4	Member, Cross			41 11 7 0	35 334	\$103.42
5	Bracket, Side	R	2.0	41 11 7 0	35 352	\$75.40
		L	2.0	41 11 7 2	208 013	\$75.40
6	Reinf, Bracket	R	1.0	41 12 7 2	207 492	\$17.30
		L	1.0	41 12 7 1	92 517	\$17.30
7	Floor, Rear			41 12 7 1	53 775	\$252.44
8	Crossmember, Floor		1.5	41 11 7 1	89 255	\$125.08
9	Floor, Side Rear	R	2.5	41 12 7 0	35 328	\$62.51
		L	2.5	41 12 7 0	35 327	\$62.51
10	Support, Axle	R	7.0	41 11 7 0	35 342	\$324.08
		L	7.0	41 11 7 0	35 341	\$324.08
11	Cover, Support	R	#6.0	41 11 7 0	35 338	\$79.90

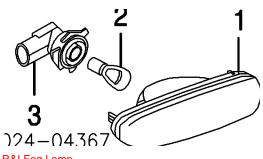
	L	#6.0	41 11 7 035 337	\$79.90
#Included in R&R Support				
INTERIOR TRIM				
2 3 5 7 8	4-0436F			
1 Panel Assy, Trim Side				
Std Sound System	R	#.4	51 47 2 752 372	\$76.67
	L	#.4	51 47 2 752 371	\$76.67
Premium Sound System	R	#.4	51 47 2 752 374	\$76.67
	L	#.4	51 47 2 752 373	\$76.67
#w/Trunk Trim Panel Removed				
2 Insert, Panel¶	R		51 47 2 752 257	\$10.02
	L		51 47 2 752 257	\$10.02
3 Cover, Panel¶				
Std Sound System	R		51 47 7 138 430	\$66.14
	L		51 47 7 138 429	\$66.14
Premium Sound System	R		51 41 2 752 968	\$32.19
	L		51 41 2 752 967	\$32.19
¶Included w/Trim Side Panel Assy				
4 Panel, Trunk Trim				
2007-08			.2 51 47 7 138 453	\$28.10
	2009			
To 5-09			.2 51 47 7 138 453	\$28.10
From 5-09			.2 51 47 7 261 967	
	2010		.2 51 47 7 261 967	
Net, Luggage Compartment				
5 Outer	R		51 47 2 754 569	\$49.30
	L		51 47 2 754 569	\$49.30
6 Center			51 47 2 754 568	\$59.17
7 Panel, Floor Trim			51 47 7 138 452	\$46.94
8 Panel, Sill Trim			51 47 7 138 451	\$50.02

REAR LAMPS

COMBINATION LAMP



	2—)			
	124-04366				
	R&I Combination Lamp	R		.4	
		L		.4	
1	Lamp, Combination				
	Amber Lens	R		.4 63 21 2 757 010	\$107.74
		L		.4 63 21 2 757 009	\$107.74
	Clear Lens	R		.4 63 21 2 757 012	\$124.74
		L		.4 63 21 2 757 011	\$124.74
2	Moulding, Lamp	R	#.1	51 13 2 752 244	\$28.02
		L	#.1	51 13 2 752 243	\$28.02
	#Included in R&R Combination Lamp				
3	Bulb, Tail Lamp	R	#.2	63 21 7 160 897	\$19.96
-	, _F	L	#.2	63 21 7 160 897	\$19.96
	Bulb, Signal				,
4	Amber Lens	R	#.2	63 21 7 160 791	\$5.72
		L	#.2	63 21 7 160 791	\$5.72
5	Clear Lens	R	#.2	63 21 7 160 897	\$19.96
		L	#.2	63 21 7 160 897	\$19.96
	#R&R One Side Complete, Included in R&I/R&R Cor Lamp	mbination			
6	Socket, Tail	R		63 21 2 756 177	\$6.95
		L		63 21 2 756 177	\$6.95
	Socket, Signal				
7	Amber Lens	R		63 21 2 756 178	\$9.28
		L		63 21 2 756 178	\$9.28
8	Clear Lens	R		63 21 2 756 176	\$6.95
		L		63 21 2 756 176	\$6.95
	REAR FOG LAMP				



R&I Fog Lamp Base Model

S Model

#.2 R #.2 L #.2

R

#.2

#Included in R&R Rear Cover or O/H Bumper Assy

1	Lamp,	Rear	Fog
	Base	Mode	اد

#.2 63 24 6 946 904 \$45.12 63 24 2 751 708

\$29.62

\$7.12

\$7.12

S Model, John Cooper Works Model

#.2 63 24 2 751 707 \$29.62

#Included in R&R Rear Cover or O/H Bumper Assy

2 Bulb, Lamp

R #.1 63 21 7 160 935 L #.1 63 21 7 160 935

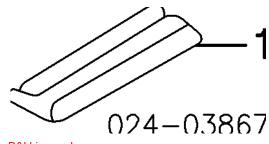
#Included in R&R Fog Lamp

R N.A.

3 Socket, Bulb

ı N.A.

LICENSE LAMP



R&I License Lamp

R #.1

L #.1

#Included in R&R Liftgate

Lamp, License-See Liftgate Section

1 Lens, License Lamp R #.1 51 13 2 756 227 \$3.15 L #.1 51 13 2 756 227 \$3.15

#Included in R&R Liftgate

SIDE MARKER LAMP



R&I Side Marker Lamp

R #.2 L #.2

#Included in R&R Rear Wheel Opening Moulding

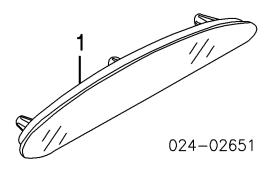
1 Lamp, Side Marker R #.2 63 13 2 751 334 \$24.79 L #.2 63 13 2 751 333 \$24.79

#Included in R&R Rear Wheel Opening Moulding

2 Bulb, Side Marker Lamp R #.2 07 11 9 905 358 \$1.98 L #.2 07 11 9 905 358 \$1.98

#Included in R&R Side Marker Lamp

HIGH MOUNT STOP LAMP



R&I Stop Lamp #.2

#w/Upper Trim Removed, Included in R&R Liftgate

1 Lamp, Stop¶ #.2 63 21 2 751 575 \$102.62

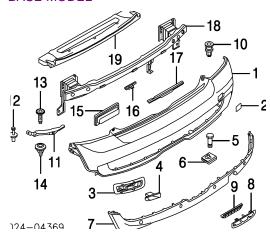
¶Order by Application

#w/Upper Trim Removed, Included in R&R Liftgate

REAR BUMPER

Procedures 27 and 28

BASE MODEL



Refinish Rear Bumper Cover	2.0
Refinish Rear Spoiler	1.0
Refinish Tow Hook Cover	.2
Refinish Rear Object Sensor	.2
R&I Rear Cover	#1.4

#Includes R&I Wheel Opening Mouldings

Add to R&I Rear Cover w/Mudguards

.6

O/H Rear Bumper Assy (Includes R&I)

#2.4

#Includes R&I Wheel Opening Mouldings

Add to R&R Rear Cover or O/H Bumper Assy

w/Rear Object Sensors	.4
w/Mudguards	.6

NOTE: All Parts in this section are included in overhaul unless noted otherwise.

1 Cover, Rear Bumper (P)

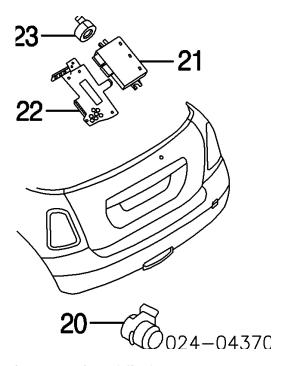
w/Aero Pkg

w/Rear Object Sensors	#2.4	51 12 7 201 900	\$326.77
w/o Rear Object Sensors	#2.4	51 12 7 199 877	\$311.20

w/o Aero Pkg

	w/Chrome Trim		#2.4	51 12 7 128 962	\$298.55
	w/o Chrome Trim		#2.4	51 12 2 755 691	\$311.20
	#Includes R&I Wheel Opening Mouldings				
2	Cover, Tow Hook (P)				
	w/Aero Pkg	R		.1 51 12 7 199 879	\$8.59
	w/o Aero Pkg	R		.1 51 12 2 755 693	\$8.59
	(P) Paint to Match				
3	Vent, Rear Cover	R		.2 51 12 7 188 620	\$38.57
		L		.2 51 12 7 188 619	\$38.57
4	Trim, Rear Bumper	R		.1 51 12 7 193 814	\$11.37
		L		.1 51 12 7 193 813	\$11.37
5	Bolt, Mounting	R		72 12 8 244 969	\$0.84
		L		72 12 8 244 969	\$0.84
6	Nut, Bolt	R		07 13 1 502 288	\$0.65
		L		07 13 1 502 288	\$0.65
7	Spoiler, Rear (P)				
	w/Rear Object Sensor		#.3	51 12 2 752 538	\$68.52
	w/o Rear Object Sensor		#.3	51 12 7 147 876	\$68.52
	(P) Paint to Match				
	#w/Bumper Cover Assy Removed				
	Trim, Spoiler				
8	w/Chrome Trim			.1 51 12 2 753 653	\$24.95
9	w/o Chrome Trim			.1 51 12 2 752 542	\$11.37
10	Rivet, Mounting	R		07 13 0 702 966	\$0.51
		L		07 13 0 702 966	\$0.51
11	Support, Cover	R		51 12 2 751 304	\$10.15
		L		51 12 2 751 303	\$10.15
12	Rivet, Support (5/Side)	R		17 11 1 712 963	\$0.25
		L		17 11 1 712 963	\$0.25
13	Screw, Mounting (2/Side)	R		07 14 7 146 367	\$0.27
		L		07 14 7 146 367	\$0.27
14	Nut, Mounting (2/Side)	R		07 13 0 702 769	\$0.75
		L		07 13 0 702 769	\$0.75
15	Breather, Vent	R	#.2	64 22 1 497 406	\$29.23
		L	#.2	64 22 1 497 406	\$29.23
16	Bracket, Center			51 12 7 126 172	\$10.62
17	Rail, Bumper			51 12 7 127 744	\$15.43
18	Bar, Impact		#.3	51 12 2 751 306	\$340.17
	Support, Bar		#.3	51 12 7 250 965	\$40.15

#w/Bumper Cover Assy Removed, Not Included in O/H



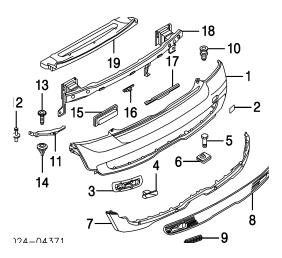
20 Sensor, Rear Object (2/Side)

Black	R	#.1	66 20 6 934 308	\$136.04
	L	#.1	66 20 6 934 308	\$136.04
Paint to Match	R	#.1	66 20 0 393 938	\$211.19
	L	#.1	66 20 0 393 938	\$211.19

#w/Bumper Cover Assy Removed, Not Included in O/H

21 Module, Object Sensor		
w/Navigation System	66 20 3 456 016	\$262.75
w/o Navigation System	66 20 3 448 378	\$270.61
22 Bracket, Module	51 12 2 751 442	\$7.90
23 Alarm, Sensor	66 21 6 903 102	\$54.12

S MODEL, JOHN COOPER WORKS MODEL



Refinish Rear Bumper Cover	2.0
Refinish Rear Spoiler	1.0
Refinish Tow Hook Cover	.2
Refinish Rear Object Sensor	.2
R&I Rear Cover	#1.4

#Includes R&I Wheel Opening Mouldings

Add to R&I Rear Cover w/Mudguards

.6

O/H Rear Bumper Assy (Includes R&I)

#2.4

#Includes R&I Wheel Opening Mouldings

Add to R&R Rear Cover or O/H Bumper Assy

w/Rear Object Sensors	.4
w/Mudguards	.6

NOTE: All Parts in this section are included in overhaul unless noted otherwise.

1 Cover, Rear Bumper (P)

w/Aero Pka

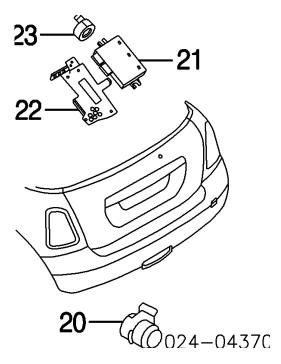
W/Acio i kg			
w/Rear Object Sensors	#2.4	51 12 7 201 899	\$326.77
w/o Rear Object Sensors	#2.4	51 12 7 199 878	\$311.20
w/o Aero Pkg	#2.4	51 12 7 128 962	\$298.55

#Includes R&I Wheel Opening Mouldings

2 Cover, Tow Hook (P)

	w/Aero Pkg	R		.1 51 12 7 199 879	\$8.59
	w/o Aero Pkg	R		.1 51 12 2 755 694	\$8.59
	(P) Paint to Match				
3	Vent, Rear Cover				
	w/Rear Object Sensor	R		.2 51 12 7 199 788	\$38.57
		L		.2 51 12 7 199 787	\$38.57
	w/o Rear Object Sensor	R		.2 51 12 7 188 620	\$38.57
		L		.2 51 12 7 188 619	\$38.57
4	Trim, Rear Bumper	R		.1 51 12 7 193 814	\$11.37
		L		.1 51 12 7 193 813	\$11.37
5	Bolt, Mounting	R		72 12 8 244 969	\$0.84
		L		72 12 8 244 969	\$0.84
6	Nut, Bolt	R		07 13 1 502 288	\$0.65
		L		07 13 1 502 288	\$0.65
7	Spoiler, Rear (P)				
	w/Rear Object Sensor		#.3	51 12 2 752 541	\$85.71
	w/o Rear Object Sensor		#.3	51 12 7 147 890	\$85.71
	(P) Paint to Match				
8	Grille, Rear Bumper		#.3	51 12 2 752 071	\$72.25
	#w/Bumper Cover Assy Removed				
9	Insert, Cover	R		51 12 2 752 400	\$11.37
		L		51 12 2 752 399	\$11.37
10	Rivet, Mounting	R		07 13 0 702 966	\$0.51
		L		07 13 0 702 966	\$0.51
11	Support, Cover	R		51 12 2 751 304	\$10.15
		L		51 12 2 751 303	\$10.15
12	Rivet, Support (5/Side)	R		17 11 1 712 963	\$0.25
-	T. W. G.	L		17 11 1 712 963	\$0.25
13	Screw, Mounting (2/Side)	R		07 14 7 146 367	\$0.27
	(a) (a) (a) (b) (b) (b) (b) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	L		07 14 7 146 367	\$0.27
14	Nut, Mounting (2/Side)	R		07 13 0 702 769	\$0.75
	rvat, Modriting (2/orde)	L		07 13 0 702 769	\$0.75
15	Breather, Vent	R	#.2	64 22 1 497 406	\$29.23
13	bleather, vent	L	#.2	64 22 1 497 406	\$29.23
16	Bracket, Center	_	π.∠	51 12 7 126 172	\$10.62
	·			51 12 7 127 744	\$10.02
	Rail, Bumper		#.3	51 12 2 751 306	\$340.17
	Bar, Impact			51 12 7 250 965	
	Support, Bar		#.3	31 12 / 230 803	\$40.15

#w/Bumper Cover Assy Removed, Not Included in O/H



20 Sensor, Rear Object (2/Side)

Black	R	#.1	66 20 6 934 308	\$136.04
	L	#.1	66 20 6 934 308	\$136.04
Paint to Match	R	#.1	66 20 0 393 938	\$211.19
	L	#.1	66 20 0 393 938	\$211.19

#w/Bumper Cover Assy Removed, Not Included in O/H

21 Module, Object Sensor¶

w/Navigation System				
2007-09		#	66 20 3 456 016	\$262.75
	2010			
To 3-10		#	66 20 3 456 016	\$262.75
From 3-10		#	66 20 3 456 016	\$262.75
w/o Navigation System		#	66 20 3 448 378	\$270.61
¶Order by Application				
22 Bracket, Module		#	51 12 2 751 442	\$7.90
23 Alarm, Sensor		#	66 21 6 903 102	\$54.12
#Not Included in O/H				

MINI

Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODES	10-1
Gas Engine OBD II Trouble Code List (P0xxx Codes) Gas Engine OBD II Trouble Code List (P1xxx Codes) Gas Engine OBD II Trouble Code List (P2xxx Codes) Gas Engine OBD II Trouble Code List (P3xxx Codes) OBD II Vehicle Applications	10-2 10-21 10-35 10-44
Gas Engine OBD II Trouble Code List (P3xxx Codes)	10-1

DIAGNOSTIC TROUBLE CODES

OBD II VEHICLE APPLICATIONS

Cooper

MINI

Cooper

2007-2008

• R56 Series, N12 Engine RC33

2007-2008 • R56 Series, N14 Engine RE33

Gas Engine OBD II Trouble Code List (P0xxx Codes)

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0030 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S Heater (Bank 1 Sensor 1) Contro Engine started, battery voltage must be at leas chassis must be well connected, the exhaust s the coolant temperature must be 80 degrees 0 must be properly functioning. The DME detec	Circuit Malfunction Conditions: t 11.5v, all electrical components must be off, the ground between the engine and the ystem must be properly sealed between the catalytic converter and the cylinder head, elsius, and the oxygen sensor heater for oxygen sensor before the catalytic converter ed the HO2S signal was in a negative voltage range referred to as "character shift gnal remains in a low state (usually less than 156 mv). In effect, it does not switch operation. sence of silicone in fuel) res crossed in wiring harness ensor or chassis ground
DTC: P0031 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S Heater (Bank 1 Sensor 1) Circuit Engine started, battery voltage must be at leas chassis must be well connected, the exhaust s the coolant temperature must be 80 degrees 0 must be properly functioning. The DME detect downward". This code sets when the H02S sic	Low Input Conditions: 11.5v, all electrical components must be off, the ground between the engine and the ystem must be properly sealed between the catalytic converter and the cylinder head, plains, and the oxygen sensor heater for oxygen sensor before the catalytic converter and the HO2S signal was in a negative voltage range referred to as "character shift nal remains in a low state. In effect, it does not switch properly in the closed loop alytic converter) has a short circuit to ground that has lasted longer than 200 seconds. Sence of silicone in fuel) res crossed in wiring harness ensor or chassis ground
DTC: P0032 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	chassis must be well connected, the exhaust sy the coolant temperature must be 80 degrees Camust be properly functioning. The DME detect	11.5v, all electrical components must be off, the ground between the engine and the stem must be properly sealed between the catalytic converter and the cylinder head, Isius, and the oxygen sensor heater for oxygen sensor before the catalytic converter d the HO2S signal remained in a high state. to the heater power circuit due to tracking inside of the HO2S connector. Remove tor for signs of oil or water. er circuit inside connector
DTC: P0036 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S Heater (Bank 1 Sensor 2) Control Engine started, battery voltage must be at least chassis must be well connected, the exhaust sy the coolant temperature must be 80 degrees Ce	Circuit Malfunction Conditions: 11.5v, all electrical components must be off, the ground between the engine and the stem must be properly sealed between the catalytic converter and the cylinder head, Isius, and the oxygen sensor heater for oxygen sensor before the catalytic converter d the HO2S signal was in a negative voltage range referred to as "character shift hal remains in a low state. ence of silicone in fuel) es crossed in wiring harness nsor or chassis ground
DTC: P0037 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	chassis must be well connected, the exhaust sy the coolant temperature must be 80 degrees Ce must be properly functioning. The DME detecte downward". This code sets when the HO2S sign	11.5v, all electrical components must be off, the ground between the engine and the stem must be properly sealed between the catalytic converter and the cylinder head, sius, and the oxygen sensor heater for oxygen sensor before the catalytic converter if the HO2S signal was in a negative voltage range referred to as "character shift all remains in a low state. In effect, it does not switch properly in the closed loop ytic converter) has a short circuit to ground that has lasted longer than 200 seconds. The ence of silicone in fuely as crossed in wiring harness ansor or chassis ground

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P0038 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: 1.6L, 1.6L Turbo	HO2S Heater (Bank 1 Sensor 2) Circuit High Input Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, the ground between the engine and the chassis must be well connected, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, the coolant temperature must be 80 degrees Celsius, and the oxygen sensor heater for oxygen sensor before the catalytic converter must be properly functioning. The DME detected the HO2S signal remained in a high state. Note: The HO2S signal circuit may be shorted to the heater power circuit due to tracking inside of the HO2S connector. Remove the connector and visually inspect the connector for signs of oil or water. Possible Causes: HO2S signal shorted to heater power circuit inside connector HO2S signal circuit shorted to ground or to system voltage
DTC: P0053 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S Heater (Bank 1 Sensor 1) Control Circuit Malfunction Conditions: Engine started, battery voltage must be at least 10.96v, all electrical components must be off, the ground between the engine and the chassis must be well connected, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, and the coolant temperature must be 80 degrees Celsius. The DME detected the HO2S signal was in a negative voltage range referred to as "character shift downward". The resistance is out of limits. The engine speed is less than 7008rpm (6208 for A/T) and the exhaust temperatures are between 350.006 and 649.995 degrees Celsius. Possible Causes: HO2S is contaminated (due to presence of silicone in fuel) HO2S signal and ground circuit wires crossed in wiring harness HO2S signal circuit is shorted to sensor or chassis ground HO2S element has failed (internal short condition)
DTC: P0054 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S Heater (Bank 1 Sensor 2) Circuit High Input Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, the ground between the engine and the chassis must be well connected, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, the coolant temperature must be 80 degrees Celsius, and the oxygen sensor heater for oxygen sensor before the catalytic converter must be properly functioning. The DME detected the H02S signal remained in a high state. The resistance is out of limits. The engin speed is less than 7008rpm (6208 for A/T) and the exhaust temperatures are between 350.006 and 649.995 degrees Celsius. Note: The H02S signal circuit may be shorted to the heater power circuit due to tracking inside of the H02S connector. Remove the connector and visually inspect the connector for signs of oil or water. Possible Causes: H02S signal shorted to heater power circuit inside connector H02S signal circuit shorted to ground or to system voltage
DTC: P0070 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Ambient Air Temperature Sensor Malfunction Conditions: Key on or engine running (at over 800rpm), the vehicle velocity is over 25mph for 26 seconds, the ambient temperature is 20 degree above or below the model figure for four seconds. This is a thermistor-type sensor with a variable resistance that changes when exposed to different temperatures. This means: the higher the temperature, the lower the resistance value. Possible Causes: IAT sensor signal circuit is grounded (check wiring & connector) Resistance value between sockets 33 and 36 out of range IAT sensor has an open circuit IAT sensor is damaged or it has failed Ambient temperature sensor at the cluster is defective
DTC: P0106 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Manifold Pressure Sensor Circuit High Conditions: Engine started, battery voltage must be at least 11v, and the differential pressure sensor detected a control deviation at the minimum limit. The closed loop control of the differential pressure in the intake manifold is suspended and replaced by a direct specification. Possible Causes: Sensor's voltage supply on Terminal 87 Sensor's ground connection faulty Signal wire to DME faulty Replace sensor
DTC: P0107 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Manifold Pressure Sensor Circuit Low Conditions: Engine started, battery voltage must be at least 11v, and the differential pressure sensor detected a control deviation at the minimum limit. The closed loop control of the differential pressure in the intake manifold is suspended and replaced by a direct specification. The MAP was too low (less than 105.0016kPa); engine stopped. Possible Causes: Sensor's voltage supply on Terminal 87 Sensor's ground connection faulty Signal wire to DME faulty Replace sensor

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0108 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Manifold Pressure Sensor Circuit Shor Engine started, battery voltage must be at least	to Battery Conditions: t 11v, and the differential pressure sensor detected a control deviation at the minimum I pressure in the intake manifold is suspended and replaced by a direct specification.); engine stopped. nal 87
DTC: P0112 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	and the DME detected the IAT sensor signal w	st beat least 185-degrees (F) and all electrical equipment (A/C, lights, etc) must be off as less than the self-test minimum. This is a thermistor-type sensor with a variable ent temperatures. This means: the higher the temperature, the lower the resistance ed (check wiring & connector) 33 and 36 out of range
2T CCM, MIL: Yes	and the DME detected the IAT sensor signal w	It beat least 185-degrees (F) and all electrical equipment (A/C, lights, etc) must be off; is more than the self-test maximum. This is a thermistor-type sensor with a variable ent temperatures. This means: the higher the temperature, the lower the resistance inspect wiring & connector) 33 and 36 out of range
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo	Intake Air Temperature Sensor Circuit In Key on or engine running, the temperature must and the DME detected the IAT sensor signal was resistance that changes when exposed to differ	termittent Failure Conditions: It beat least 185-degrees (F) and all electrical equipment (A/C, lights, etc) must be off; It so more than the self-test maximum. This is a thermistor-type sensor with a variable ent temperatures. This means: the higher the temperature, the lower the resistance t intake air sensor values exceeds 9.75 degrees Celsius. Inspect wiring & connector) 33 and 36 out of range
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper	ECT Sensor Circuit Range/Performance Engine started (cold) for 10 seconds, battery v	Itage must be 11.5, and all equipment must be off. The DME detected the ECT sensor s is a thermistor-type sensor with a variable resistance that changes when exposed to ed in the wiring harness s in temperature
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper	ECT Sensor Circuit Low Input Conditions Engine started (cold) for 10 seconds, battery v	Itage must be 11.5, and all equipment must be off. The DME detected the ECT sensor s is a thermistor-type sensor with a variable resistance that changes when exposed to ed in the wiring harness s in temperature

	DIAGNOSTIC TROUBLE CODES - C	
DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P0118 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	ECT Sensor Circuit High Input Conditions: Engine started (cold) for 10 seconds, battery voltage must be 11.5, and all equipment must be off. The DME detected the ECT ser signal was more than the self-test maximum. This is a thermistor-type sensor with a variable resistance that changes when expos to different temperatures Possible Causes: • ECT sensor signal circuit is open (inspect wiring & connector) • ECT sensor is damaged or it has failed	
DTC: P0119 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	ECT Sensor Circuit Continuity Conditions: Engine started (cold) for 10 seconds, battery voltage must be 11.5, and all equipment must be off. The DME detected the ECT sensor signal was out of the specified range. This is a thermistor-type sensor with a variable resistance that changes when exposed to different temperatures Possible Causes: ECT sensor signal circuit is open (inspect wiring & connector) ECT sensor signal circuit is shorted to ground ECT sensor is damaged or it has failed	
DTC: P0122 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Throttle/Pedal Position Sensor Circuit Low Input Conditions: Engine started, at idle, the temperature must be at least 80 degrees Celsius. The throttle position sensor supplies implausible signate to the DME. Possible Causes: • TP sensor signal circuit open (inspect wiring & connector) • TP sensor signal shorted to ground (inspect wiring & connector) • TP sensor is damaged or has failed • Throttle control module's voltage supply is shorted or open	
DTC: P0123 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	TP Sensor Circuit High Input Conditions: Engine started, at idle, the temperature must be at least 80 degrees Celsius. The DME detected the TP sensor signal was more than the self-test maximum during testing. Possible Causes: TP sensor not seated correctly in housing (may be damaged) TP sensor signal is circuit shorted to ground or system voltage TP sensor ground circuit is open (check the wiring harness) TP sensor and/or DME has failed	
DTC: P0125 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	ECT Sensor Insufficient for Closed Loop Fuel Control Conditions: Engine started (cold), battery voltage must be 11.5, and all equipment must be off. The DME detected the ECT sensor exceeded the required calibrated value, or the engine is at idle and doesn't reach operating temperature quickly enough; the Catalyst, Fuel System H02S and Misfire Monitor did not complete, or the timer expired. Testing completion of procedure, the engine's temperature must rise uniformly during idle. Possible Causes: Check for low coolant level or incorrect coolant mixture DME detects a short circuit wiring in the ECT CHT sensor is out-of-calibration or it has failed ECT sensor is out-of-calibration or it has failed	
DTC: P0128 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature) Conditions: The engine's warm up performance is monitored by comparing measured coolant temperature with the modeled coolant temperature to detect a defective coolant thermostat. The engine temperature must be less than 65 degrees Celsius, engine speed greater than 800rpm (with the vehicle speed greater than 10 but less than 90km/h) and the ambient temperature greater than —8 degrees Celsius The thermostat should be wide open when cold, but is in error if it opens below desired control temperature. Possible Causes: Check for low coolant level or incorrect coolant mixture DME detects a short circuit wiring in the ECT CHT sensor is out-of-calibration or it has failed ECT sensor is out-of-calibration or it has failed Replace the thermostat	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0130 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: Aff	O2 Sensor Circuit Bank 1 Sensor 1 Con Engine running, battery voltage 11.5, all elect exhaust system must be properly sealed betwee implausible or not detected. The engine speed Possible Causes: Oxygen sensor heater for oxygen HO2S is contaminated (due to pre HO2S signal and ground circuit w HO2S signal circuit is shorted to se	litions: ical components off, ground between engine and chassis well connected and the en catalytic converter and the cylinder head. The DME detected the HO2S signal was is less than 8000 rpm. ensor (HO2S) before catalytic converter is faulty sence of silicone in fuel) res crossed in wiring harness ensor or chassis ground converter has failed (internal short condition)
DTC: P0131 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	exhaust system must be properly sealed between a negative voltage range referred to as "charac	cal components off, ground between engine and chassis well connected and the en catalytic converter and the cylinder head. The DME detected the HO2S signal was in er shift downward". This code sets when the HO2S signal remains in a low state for a witch properly in the closed loop operation. Engine speed is less than 8000rpm. sence of silicone in fuel) res crossed in wiring harness ensor or chassis ground short condition)
DTC: P0132 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S (Bank 1 Sensor 1) Circuit High In Engine running, battery voltage 11.5, all electr exhaust system must be properly sealed betwe a high state. This code sets when the H02S sign properly in the closed loop operation.	ut Conditions: cal components off, ground between engine and chassis well connected and the en catalytic converter and the cylinder head. The DME detected the HO2S signal was in nal remains in a high state for a measured period of time. In effect, it does not switch to the heater power circuit due to tracking inside of the HO2S connector. Remove tor for signs of oil or water. ence of silicone in fuel) res crossed in wiring harness ensor or chassis ground short condition)
DTC: P0133 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 1 Sensor 1) Circuit Slow Re Engine running, battery voltage 11.5, all electrexhaust system must be properly sealed between diffequency were out of the normal range (e. 1984 to 3488rpm (1888 to 3296 for A/T), the obstween 24.85 and 68.35mph. The ambient pre Possible Causes:	sponse Conditions: cal components off, ground between engine and chassis well connected and the en catalytic converter and the cylinder head. The DME detected the HO2S amplitude g., the HO2S rich to lean switch) during the HO2S Monitor test. The engine speed is bolant temperature is greater than 80.25 degrees Celsius and the vehicle speed is ssure is greater than 75.00114kPa. c converter is contaminated (due to presence of silicone in fuel); Run the engine for cleaning effect
DTC: P0135 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: All Transmissions: All	HO2S (Bank 1 Sensor 1) Heater Circuit I Engine running, battery voltage is between 11 a connected and the exhaust system must be pro	nd 16 volts, all electrical components off, ground between engine and chassis well perly sealed between catalytic converter and the cylinder head. The DME detected an essive current draw in the heater circuit during the CCM test. The engine load is 25 to en 450 and 700 degrees Celsius. pr heater ground circuit open

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P0136 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 1 Sensor 2) Circuit Malfunction Conditions: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the HO2S signal failed to meet the maximum or minimum voltage levels (i.e., it failed the voltage range check). The heater has been on for less than 90 seconds, the fuel system status is in fuel cut-off, the output voltage is between 400mV and 500mV and it is 120 seconds after engine start up. The engine speed is less than 8000rpm. Possible Causes: Leaks present in the exhaust manifold or exhaust pipes HO2S signal wire and ground wire crossed in connector HO2S element is fuel contaminated or has failed	
DTC: P0137 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 1 Sensor 2) Circuit Low Input Conditions: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the HO2S signal remained in a high state. Note: The HO2S signal circuit may be shorted to the heater power circuit due to "tracking inside of the HO2S connector. Remove the connector and visually inspect the connector for signs of oil or water. Possible Causes: HO2S signal shorted to heater power circuit in the connector HO2S signal circuit shorted to ground (for more than 200 seconds) or to system voltage	
DTC: P0138 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 1 Sensor 2) Circuit High Input Conditions: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the HO2S signal remained in a high state. Note: The HO2S signal circuit may be shorted to the heater power circuit due to "tracking inside of the HO2S connector. Remove the connector and visually inspect the connector for signs of oil or water. Possible Causes: HO2S signal shorted to heater power circuit in the positive connector HO2S signal circuit shorted to ground or to system voltage HO2S has failed	
DTC: P0141 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 1 Sensor 2) Malfunction Conditions: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the HO2S signal failed to meet the maximum or minimum voltage levels (i.e., it failed the voltage range check). The engine speed is greater than 40rpm, the battery voltage must be between 10.7 and 15.5 volts, and the fault occurs 200 seconds after engine start up. Possible Causes: Leaks present in the exhaust manifold or exhaust pipes HO2S signal wire and ground wire crossed in connector HO2S element is fuel contaminated or has failed	
DTC: P0153 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 2 Sensor 1) Circuit Slow Response Conditions: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the HO2S amplitude and frequency were out of the normal range during the HO2S Monitor test. For the 1999 M62: The idle speed variation is between 1400 and 2600rpm, the engine load variation is between 20 and 54 while the catalyst temperature should be greater than 360 degree Celsius. Possible Causes: HO2S is contaminated (due to presence of silicone in fuel) Leaks present in the exhaust manifold or exhaust pipes HO2S is damaged or has failed	
DTC: P0154 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 2 Sensor 1) Circuit No Activity Conditions: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the HO2S signal failed to meet the maximum or minimum voltage (i.e., it failed the voltage check). Possible Causes: • Leaks present in the exhaust manifold or exhaust pipes • HO2S signal wire and ground wire crossed in connector • HO2S element is fuel contaminated or has failed	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0171 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel System Too Lean (Cylinder Bank Key on or engine running, all electrical comp the Bank 1 Adaptive Fuel Control System rear pattern, the coolant temperature is greater that Possible Causes: • Air leaks after the MAF sensor, or • Exhaust leaks before or near where Fuel injector(s) restricted or not services.	Conditions: onents off and coolant temperature at least 80 degrees Celsius; and the DME detected hed its rich correction limit (a lean A/F condition). The fuel status is in a closed loop of 7 degrees Celsius, and the engine speed is less than 1400rpm. leaks in the PCV system the HO2S is mounted upplying enough fuel fuel during high fuel demand conditions of R valve diaphragm underestimate airflow)
DTC: P0172 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	the Bank 1 Adaptive Fuel Control System read pattern, the coolant temperature is greater tha Possible Causes:	nents off and coolant temperature at least 80 degrees Celsius; and the DME detected ned its rich correction limit (a rich A/F condition). The fuel status is in a closed loop 7 degrees Celsius, and the engine speed is less than 1400rpm. e engine has an oil overfill condition e (may be pulling vacuum) d or leaking h alcohol or water correct or out-of-range
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper	Cylinder 1 Injector Circuit Malfunction Engine started, and the DME detected the fuel state when it should have been high (wiring he the engine speed is less than 40rpm. Possible Causes: Injector 1 connector is damaged, Injector 1 control circuit is open, s (the injector driver circuit may be date	njector "1" control circuit was in a high state when it should have been low, or in a low rness & injector okay). The battery voltage should be between 9.5 and 17 volts while pen or shorted norted to ground or to power
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper	Cylinder 2 Injector Circuit Malfunction (Engine started, and the DME detected the fuel state when it should have been high (wiring has the engine speed is less than 40rpm. Possible Causes: Injector 2 connector is damaged, of Injector 2 control circuit is open, so (the injector driver circuit may be darked)	njector "2" control circuit was in a high state when it should have been low, or in a low rness & injector okay). The battery voltage should be between 9.5 and 17 volts while pen or shorted norted to ground or to power
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper	Cylinder 3 Injector Circuit Malfunction C Engine started, and the DME detected the fuel state when it should have been high (wiring ha the engine speed is less than 40rpm. Possible Causes: Injector 3 connector is damaged, of Injector 3 control circuit is open, so (the injector driver circuit may be dan	njector "3" control circuit was in a high state when it should have been low, or in a low mess & injector okay). The battery voltage should be between 9.5 and 17 volts while pen or shorted norted to ground or to power
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper	state when it should have been high (wiring ha the engine speed is less than 40rpm. Possible Causes: • Injector 4 connector is damaged, o	njector "4" control circuit was in a high state when it should have been low, or in a low ness & injector okay). The battery voltage should be between 9.5 and 17 volts while

DTC	Trouble Code Title, Conditions & Possible Causes		
DTC: P0218 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Engine Oil Over Temperature Conditions: The oil temperature difference of greater than 100 degrees within one second. The ignition must be on. The DME detected an erro the Engine Oil Temperature sensor. This occurs during attempted start value calibration. Possible Causes: • Replace the oil temperature sensor • Engine Oil temperature is too high • Engine coolant temperature is too high • Highest possible gear engaged in transmission • Check coolant		
DTC: P0222 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Throttle Position Sensor 'B' Circuit Low Input Conditions: Engine started, battery voltage at least 11.5v, all electrical components off, ground connections between engine and chassis well connected, coolant temperature at least 80-degrees Celsius and the throttle valve must not be damaged or dirty; and the DME detected the TP Sensor 'B' circuit was out of its normal operating range during a condition with the throttle wide open, or with it completely closed. The throttle valve activation occurs via an electric motor (throttle drive) in the throttle valve control module. It is activated by the DME according to specifications of the two sensors, Throttle Position Sensor and Accelerator Pedal Position Sensor 2. Slowly depress accelerator pedal up to Wide Open Throttle (WOT) stop while observing the percentage display on the PID data function of the scan tool. The percentage display must increase uniformly. Possible Causes: • ETC TP Sensor 'B' connector is damaged or shorted • ETC TP Sensor 'B' signal circuit is shorted to ground • ETC TP Sensor 'B' is damaged or it has failed		
DTC: P0223 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Throttle Position Sensor 'B' Circuit High Input Conditions: Engine started, battery voltage at least 11.5v, all electrical components off, ground connections between engine and chassis well connected, coolant temperature at least 80-degrees Celsius and the throttle valve must not be damaged or dirty; and the DME detected the TP Sensor 'B' circuit was out of its normal operating range during a condition with the throttle wide open, or with it completely closed. The throttle valve activation occurs via an electric motor (throttle drive) in the throttle valve control module. It is activated by the DME according to specifications of the two sensors, Throttle Position Sensor and Accelerator Pedal Position Sensor 2. Slowly depress accelerator pedal up to Wide Open Throttle (WOT) stop while observing the percentage display on the PIE data function of the scan tool. The percentage display must increase uniformly. Possible Causes: • ETC TP Sensor 'B' connector is damaged or open • ETC TP Sensor 'B' signal circuit is open • ETC TP Sensor 'B' signal circuit is shorted to VREF (5v) • ETC TP Sensor 'B' is damaged or it has failed		
DTC: P0261 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder 1 Injector Circuit Low Input/Short to Ground Conditions: Key on or engine running, fuses in the instrument panel and the E-box in the engine compartment must be functioning, and the ground connections between the engine ad the chassis must be well connected; and the DME detected an unexpected voltage condition on the injector circuit. Possible Causes: Injector 1 control circuit is open Injector 1 power circuit (B+) is open Injector 1 control circuit is shorted to chassis ground Injector 1 is damaged or has failed DME is not connected or has failed		
DTC: P0262 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder 1 Injector Circuit Low Input/Short to B+ Conditions: Key on or engine running, fuses in the instrument panel and the E-box in the engine compartment must be functioning, and the ground connections between the engine ad the chassis must be well connected; and the DME detected an unexpected voltage condition on the injector circuit. Possible Causes: Injector control circuit is open Injector power circuit (B+) is open Injector control circuit is shorted to chassis ground Injector is damaged or has failed DME is not connected or has failed Fuel pump relay has failed Fuel injectors may have malfunctioned Faulty engine speed sensor		

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0264 2T CCM, MfL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder 2 Injector Circuit Low Input/Sh Key on or engine running, fuses in the instrun	ort to Ground Conditions: nent panel and the E-box in the engine compartment must be functioning, and the chassis must be well connected; and the DME detected an unexpected voltage n chassis ground
DTC: P0265 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder 2 Injector Circuit Low Input/Sh Key on or engine running, fuses in the instrum ground connections between the engine ad the condition on the injector circuit. Possible Causes: Injector control circuit is open Injector power circuit (B+) is ope Injector power circuit is shorted to Injector is damaged or has failed DME is not connected or has failed Fuel pump relay has failed Fuel injectors may have malfunctic Faulty engine speed sensor	ent panel and the E-box in the engine compartment must be functioning, and the chassis must be well connected; and the DME detected an unexpected voltage chassis ground
DTC: P0267 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder 3 Injector Circuit Low Input/Sh Key on or engine running, fuses in the instrum ground connections between the engine ad the condition on the injector circuit. Possible Causes: Injector control circuit is open Injector power circuit (B+) is ope Injector control circuit is shorted to Injector is damaged or has failed DME is not connected or has failed Fuel pump relay has failed Fuel injectors may have malfunction Faulty engine speed sensor	ent panel and the E-box in the engine compartment must be functioning, and the chassis must be well connected; and the DME detected an unexpected voltage chassis ground
DTC: P0268 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder 3 Injector Circuit Low Input/Sh Key on or engine running, fuses in the instrum ground connections between the engine ad the condition on the injector circuit. Possible Causes: Injector control circuit is open Injector power circuit (B+) is oper Injector control circuit is shorted to Injector is damaged or has failed DME is not connected or has failed Fuel pump relay has failed Fuel injectors may have malfunction Faulty engine speed sensor	ent panel and the E-box in the engine compartment must be functioning, and the chassis must be well connected; and the DME detected an unexpected voltage chassis ground

DTC	Trouble Code Title, Conditions & Possible Causes		
DTC: P0270 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder 4 Injector Circuit Low Input/Short to Ground Conditions: Key on or engine running, fuses in the instrument panel and the E-box in the engine compartment must be functioning, and the ground connections between the engine ad the chassis must be well connected; and the DME detected an unexpected voltage condition on the injector circuit. Possible Causes: Injector control circuit is open Injector power circuit (B+) is open Injector control circuit is shorted to chassis ground Injector is damaged or has failed DME is not connected or has failed Fuel pump relay has failed Fuel injectors may have malfunctioned Faulty engine speed sensor		
DTC: P0271 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder 4 Injector Circuit Low Input/Short to B + Conditions: Key on or engine running, fuses in the instrument panel and the E-box in the engine compartment must be functioning, and the ground connections between the engine ad the chassis must be well connected; and the DME detected an unexpected voltage condition on the injector circuit. Possible Causes: Injector control circuit is open Injector power circuit (B+) is open Injector control circuit is shorted to chassis ground Injector is damaged or has failed DME is not connected or has failed Fuel pump relay has failed Fuel injectors may have malfunctioned Faulty engine speed sensor		
DTC: P0300 2T MISFIRE, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Random/Multiple Misfire Detected Conditions: Engine running at an RPM greater than 600 but less than 7000 the DME detected a misfire or uneven engine running in two or more cylinders within 1000 engine revolutions. The sum of misfires caused an increase in emissions for the first 1000 revolutions after start up, or the sum of misfires caused catalyst damage after the first 200 engine revolutions. Time after start less than one second. Note: If the misfire is severe, the MIL will flash on/off on the first trip! Possible Causes: Fuel metering fault that affects two or more cylinders Fuel pressure too low or too high, fuel supply contaminated EVAP system problem or the EVAP canister is fuel saturated EGR valve is stuck open or the PCV system has a vacuum leak Ignition system fault (coil, plugs) affecting two or more cylinders MAF sensor contamination (it can cause a very lean condition) Vehicle driven while very low on fuel (less than 1/8 of a tank)		
DTC: P0301 2T MISFIRE, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder Number 1 Misfire Detected Conditions: Engine running at an RPM greater than 600 but less than 7000 the DME detected a misfire or uneven engine running in two or more cylinders within 1000 engine revolutions. The sum of misfires caused an increase in emissions for the first 1000 revolutions after start up, or the sum of misfires caused catalyst damage after the first 200 engine revolutions. Time after start less than one second. Note: If the misfire is severe, the MIL will flash on/off on the first trip! Possible Causes: Air leak in the intake manifold, or in the EGR or DME system Base engine mechanical problem Fuel delivery component problem (i.e., a contaminated, dirty or sticking fuel injector) Fuel pump relay defective Ignition coil fuses have failed Ignition system problem (dirty damaged coil or plug) Engine speed (RPM) sensor has failed Camshaft position sensors have failed Ignition coil is faulty Spark plugs are not working properly or are not gapped properly		

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P0302 2T MISFIRE, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder Number 2 Misfire Detected Conditions: Engine running at an RPM greater than 600 but less than 7000 the DME detected a misfire or uneven engine running in two or more cylinders within 1000 engine revolutions. The sum of misfires caused an increase in emissions for the first 1000 revolutions after start up, or the sum of misfires caused catalyst damage after the first 200 engine revolutions. Time after start less than one second. Note: If the misfire is severe, the MIL will flash on/off on the 1st trip! Possible Causes: Air leak in the intake manifold, or Base engine mechanical problem Fuel delivery component problem Fuel pump relay defective Ignition coil fuses have failed Ignition system problem (dirty danaged coil or plug) Engine speed (RPM) sensor has failed Camshaft position sensors have failed Ignition coil is faulty Spark plugs are not working properly
DTC: P0303 2T MISFIRE, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder Number 3 Misfire Detected Conditions: Engine running at an RPM greater than 600 but less than 7000 the DME detected a misfire or uneven engine running in two or more cylinders within 1000 engine revolutions. The sum of misfires caused an increase in emissions for the first 1000 revolutions after start up, or the sum of misfires caused catalys damage after the first 200 engine revolutions. Time after start less than one second. Note: If the misfire is severe, the MIL will flash on/off on the 1st trip! Possible Causes: Air leak in the intake manifold, or the EGR or DME system Base engine mechanical problem Fuel delivery component problem Fuel delivery component problem Ignition coil fuses have failed Ignition system problem (dirty damaged coil or plug) Engine speed (RPM) sensor has failed Ignition coil is faulty Spark plugs are not working properly or are not gapped properly
DTC: P0304 2T MISFIRE, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cylinder Number 4 Misfire Detected Conditions: Engine running at an RPM greater than 600 but less than 7000 the DME detected a misfire or uneven engine running in two or more cylinders within 1000 engine revolutions. The sum of misfires caused an increase in emissions for the first 1000 revolutions after start up, or the sum of misfires caused catalys damage after the first 200 engine revolutions. Time after start less than one second. Note: If the misfire is severe, the MIL will flash on/off on the 1st trip! Possible Causes: Air leak in the intake manifold, or in the EGR or DME system Base engine mechanical problem Fuel delivery component problem (i.e., a contaminated, dirty or sticking fuel injector) Fuel pump relay defective Ignition coil fuses have failed Ignition system problem (dirty damaged coil or plug) Engine speed (RPM) sensor has failed Camshaft position sensors have failed Ignition coil is faulty Spark plugs are not working properly or are not gapped properly

DTC	Trouble Code Title, Conditions & Possible Causes		
DTC: P0313 2T MISFIRE, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Misfire Detected with Low Fuel Conditions: Engine running under positive torque conditions, and the DME detected a misfire or uneven engine function as well as an indication of low fuel level when another misfire was detected. Note: If the misfire is severe, the MIL will flash on/off on the 1st trip! Possible Causes: Air leak in the intake manifold, or in the EGR or DME system Base engine mechanical problem Fuel delivery component problem (i.e., a contaminated, dirty or sticking fuel injector) Fuel pump relay defective Ignition coil fuses have failed Ignition system problem (dirty damaged coil or plug) Engine speed (RPM) sensor has failed Camshaft position sensors have failed Ignition coil is faulty Spark plugs are not working properly or are not gapped properly		
DTC: P0324 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Knock Control System Error Conditions: Engine started, vehicle driven, and the DME detected the Knock Sensor 1 (KS1) signal was too low or not recognized by the DME. Possible Causes: • Knock sensor circuit is open • Knock sensor is loose (tighten to 20 NM) • Contact between the knock sensor and cylinder block is dirty, corroded or greasy • Knock sensor circuit is shorted to ground, or shorted to power • Knock sensor is damaged or it has failed • Wrong kind of fuel used • A component in the engine compartment is loose or not properly secured		
DTC: P0326 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Knock Sensor Circuit Malfunction Conditions: Engine started, vehicle driven at 1520rpm for 3 seconds or to a temperature of 40 degrees Celsius, and the DME detected the Knock Sensor 1 (KS1) signal was not recognized. The engine speed is greater than 2016rpm and the coolant temperature is greater than 50.25 degrees Celsius. The difference between raw and filtered knock sensor signal is less than 0.0499 to 0.0698 volts. Possible Causes: • Knock sensor circuit is open • Knock sensor is loose (tighten to 20 NM) • Contact between the knock sensor and cylinder block is dirty, corroded or greasy • Knock sensor circuit is shorted to ground, or shorted to power • Knock sensor is damaged or it has failed • Wrong kind of fuel used • A component in the engine compartment is loose or not properly secured		
DTC: P0335 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Camshaft Position Sensor "A" Circ Malfunction Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park and the ground between the engine and the chassis must be well connected. The DME detected the CMP sensor signal was implausible or missing. Engine speed is greater than 500rpm, and the fault is tolerable as long as there are no misfired occurring at the same time. Possible Causes: CMP sensor circuit is open or shorted to ground CMP sensor circuit is shorted to power CMP sensor ground (return) circuit is open CMP sensor installation incorrect (Hall-effect type) CMP sensor is damaged or CMP sensor shielding damaged		
DTC: P0336 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Camshaft Position Sensor "A" Circ Range/Performance Conditions: Engine started (and engine speed is less than 25rpm), battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park and the ground between the engine and the chassis must be well connected. The DME detected the CMP sensor signal was implausible. Possible Causes: CMP sensor circuit is open or shorted to ground CMP sensor circuit is shorted to power CMP sensor ground (return) circuit is open CMP sensor installation incorrect (Hall-effect type) CMP sensor is damaged or CMP sensor shielding damaged		

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0340	Camshaft Position Sensor Circuit Malfu	
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmis	rted to ground ower t is open (Hall-effect type)
DTC: P0341 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Camshaft Position Sensor Circ Range/P Engine started, battery voltage must be at leas daytime driving lights off), automatic transmis be well connected. The DME detected the CMI Possible Causes: • CMP sensor circuit is open or sho • CMP sensor circuit is shorted to g	11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park and the ground between the engine and the chassis must sensor signal was implausible.
	CMP sensor circuit is shorted to perform the component of the compone	t is open Hall-effect type)
DTC: P0351 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: All Transmissions: All	daytime driving lights off), automatic transmis be well connected. The DME did not receive a	11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park and the ground between the engine and the chassis must y valid pulses from the ignition module for the Ignition Coilpack A primary circuit. are one component and cannot be replaced individually. iled as failed in open circuit upply as failed
DTC: P0352 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: All Transmissions: All	daytime driving lights off), automatic transmis be well connected. The DME did not receive an	11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park and the ground between the engine and the chassis must y valid pulses from the ignition module for the Ignition Coilpack A primary circuit. are one component and cannot be replaced individually. iled as failed in open circuit upply as failed
DTC: P0353 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: All Transmissions: All	daytime driving lights off), automatic transmis be well connected. The DME did not receive ar	11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park and the ground between the engine and the chassis must y valid pulses from the ignition module for the Ignition Coilpack A primary circuit. are one component and cannot be replaced individually. iled as failed n open circuit upply as failed

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P0354 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: All Transmissions: All	Ignition Coilpack A Primary/Secondary Circuit Malfunction Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park and the ground between the engine and the chassis must be well connected. The DME did not receive any valid pulses from the ignition module for the Ignition Coilpack A primary circuit. Note: Ignition coils and power output stages are one component and cannot be replaced individually. Possible Causes: • Engine speed (RPM) sensor has failed
	 Camshaft Position (CMP) sensor has failed Power Supply Relay is shorted to an open circuit There is a malfunction in voltage supply Ignition coilpack is damaged or it has failed Cylinder 1 to 4 Fuel Injector(s) have failed
MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Catalyst System Efficiency (Bank 1) Below Threshold Conditions: Engine started for longer than one second, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected the switch rate of the rear H02S-12 was close to the switch rate of front H02S (it should be much slower). The coolant temperature is greater than 80.25 degrees Celsius. The fuel system is in closed loop. The vehicle speed is between 28 and 80.8mph. The engine speed is between 1984 and 3648rpm. Exhaust gas temperature is between 450 and 700 degrees Celsius. Ambient pressure is 75.001kPa. Possible Causes:
	 Air leaks at the exhaust manifold or in the exhaust pipes Catalytic converter is damaged, contaminated or it has failed ECT/CHT sensor has lost its calibration (the signal is incorrect) Engine cylinders misfiring, or the ignition timing is over retarded Engine oil is contaminated Front HO2S or rear HO2S is contaminated with fuel or moisture Front HO2S and/or the rear HO2S is loose in the mounting hole Front HO2S much older than the rear HO2S (HO2S-11 is lazy) Fuel system pressure is too high (check the pressure regulator) Rear HO2S wires improperly connected or the HO2S has failed
DTC: P0441 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Emission System Incorrect Purge Flow Conditions: ECT sensor is cold during startup, engine started, battery voltage must be at least 11.5v, all electrical components must be off. The coolant temperature is less than 60 degrees Celsius, and the ambient pressure is greater than 76.2994kPa. The air intake temperature at start is between 9.04 and 16.04 degrees Celsius. The change in barometric pressure since engine start is less than 0.9998kPa. The vehicle speed is less than 74.56mph, and the purge valve has opened enough on previous driving cycle. The DME detected the switch rate of the rear H02S-12 was close to the switch rate of front H02S (it should be much slower). DME detected a problem in the EVAP system during the EVAP System Monitor test. Possible Causes: EVAP canister purge valve is damaged EVAP canister purge valve is damaged Vapor line between purge solenoid and intake manifold vacuum reservoir is damaged, or vapor line between EVAP canister purge solenoid and charcoal canister is damaged Vapor line between charcoal canister and check valve, or vapor line between check valve and fuel vapor valves is damaged
DTC: P0442 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Emission System Small Leak Detected Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off. The DME detected a leak in the EVAP system as small as 0.040 inches during the EVAP Monitor Test. The coolant temperature is less than 60 degrees Celsius, and the ambient pressure is greater than 76.2994kPa. The air intake temperature at start is between 9.04 and 16.04 degrees Celsius. The change in barometric pressure since engine start is less than 0.9998kPa. The vehicle speed is less than 74.56mph, and the purge valve has opened enough on previous driving cycle. Possible Causes: • Aftermarket EVAP parts that do not conform to specifications • CV solenoid remains partially open when commanded to close • EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve). • Fuel filler cap damaged, cross-threaded or loosely installed • Loose fuel vapor hose/tube connections to EVAP components • Small holes or cuts in fuel vapor hoses or EVAP canister tubes

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0443 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmis catalytic converter and the cylinder head, cool oxygen sensors before the catalytic converter	11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park, the exhaust system must be properly sealed between the ant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for must be functioning properly and the ground between the engine and the chassis must pected high or low voltage condition on the Vapor Management Valve (VMV) circuiting. pen or shorted to ground orted to power (B+)
DTC: P0444 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmis catalytic converter and the cylinder head, cool oxygen sensors before the catalytic converter	11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park, the exhaust system must be properly sealed between the ant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for nust be functioning properly and the ground between the engine and the chassis must pected voltage condition on the EVAP circuit when the device was cycled On/Off during en or shorted to ground orted to power (B+) r it has failed
DTC: P0445 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmis catalytic converter and the cylinder head, cool oxygen sensors before the catalytic converter	11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park, the exhaust system must be properly sealed between the int temperature must be at least 80 degrees Celsius and oxygen sensor heaters for nust be functioning properly and the ground between the engine and the chassis must pected voltage condition on the EVAP circuit when the device was cycled On/Off during en or shorted to ground orted to power (B+) r it has failed
DTC: P0455 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	degrees Celsius, and the ambient pressure is degrees Celsius. The change in barometric pre 74.56mph, and the purge valve has opened en detected a large leak in the system during the Possible Causes: • Aftermarket EVAP hardware non-c	11.5v, all electrical components must be off. The coolant temperature is less than 60 reater than 76.2994kPa. The air intake temperature at start is between 9.04 and 16.04 source since engine start is less than 0.9998kPa. The vehicle speed is less than bugh on previous driving cycle. The DME detected multiple small fuel vapor leaks; or it eak test. Informing to specifications purge outlet tube or EVAP return tube disconnected based, or canister damaged ightened) or the wrong part stions to EVAP components ppen

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P0456 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Control System Small Leak Detected Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off. The coolant temperature is less than 60 degrees Celsius, and the ambient pressure is greater than 76.2994kPa. The air intake temperature at start is between 9.04 and 16.04 degrees Celsius. The change in barometric pressure since engine start is less than 0.9998kPa. The vehicle speed is less than 74.56mph, and the purge valve has opened enough on previous driving cycle. The DME detected multiple small fuel vapor leaks; or it detected a large leak in the system during the leak test. Possible Causes: Aftermarket EVAP hardware non-conforming to specifications EVAP canister tube, EVAP canister purge outlet tube or EVAP return tube disconnected or cracked, or canister is damaged EVAP canister purge valve stuck closed, or canister damaged Fuel filler cap missing, loose (not tightened) or the wrong part Loose fuel vapor hose/tube connections to EVAP components Canister vent (CV) solenoid stuck open Fuel tank pressure (FTP) sensor has failed mechanically
DTC: P0458 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Evaporative Emission System Purge Control Valve Circuit High: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected an unexpected voltage condition on the EVAP circuit when the device was cycled On/Off during testing. Possible Causes: EVAP power supply circuit is open EVAP solenoid control circuit is open or shorted to ground EVAP solenoid control circuit is shorted to power (B+) EVAP solenoid valve is damaged or it has failed EVAP canister has a leak or a poor seal
DTC: P0459 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Evaporative Emission System Purge Control Valve Circuit Low: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected an unexpected voltage condition on the EVAP circuit when the device was cycled On/Off during testing. Possible Causes: EVAP power supply circuit is open EVAP solenoid control circuit is open or shorted to ground EVAP solenoid control circuit is shorted to power (B+) EVAP solenoid valve is damaged or it has failed EVAP canister has a leak or a poor seal
DTC: P0460 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level Signal 1: The DME detected a high condition on the pump. Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring
DTC: P0461 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level Signal 1: The DME detected a high condition on the pump. Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring
DTC: P0462 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level Signal 1: The DME detected a high condition on the pump. Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0463 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level Signal 1: The DME detected a high condition on the pur Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring	
DTC: P0500 2T MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	signal is not usable. Note: The DME receives vehicle speed data	all speed, and the DME detected a loss of the VSS signal over a period of time or the rom the VSS, TCSS, ABS module, CTM or GEM controller, depending up the because of possible tampering. Check DSC and wires. ed to ground round ower and related control module ts are damaged arness circuits are damaged
DTC: P0506 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmis catalytic converter and the cylinder head, cool heaters for oxygen sensors before the catalytic	10.96v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park, the exhaust system must be properly sealed between the nt temperature must be between 80.25 and 110.25 degrees Celsius and oxygen sensor converter must be functioning properly and the ground between the engine and the cted it could not control the idle speed correctly, as it is constantly more than 100 rpm element is severely clogged
DTC: P0507 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmis catalytic converter and the cylinder head, cool heaters for oxygen sensors before the catalytic	10.96v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park, the exhaust system must be properly sealed between the nt temperature must be between 80.25 and 110.25 degrees Celsius and oxygen sensor converter must be functioning properly and the ground between the engine and the cted it could not control the idle speed correctly, as it is constantly more than 200 rpm after the throttle body assis ground lied
DTC: P0532 MIL: No Years: Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	A/C Refrigerant Pressure Sensor "A" Ci The DME detected a low condition on the sens Possible Causes: • The A/C Refrigerant Pressure Sens • The DME has failed	pr.
DTC: P0533 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	A/C Refrigerant Pressure Sensor "A" Ci The DME detected a high condition on the sen Possible Causes: The A/C Refrigerant Pressure Sens The DME has failed	sor.

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P0562 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	System Voltage Low Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, and the ground between the engine and the chassis must be well connected. The DME has detected a voltage value that is below the specified minimum limit for the system to function properly. Possible Causes: Alternator damaged or faulty Battery voltage low or insufficient Fuses blown or circuits open Battery connection to terminal not clean Voltage regulator has failed
DTC: P0563 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	System Voltage High Conditions: Engine started for 18 seconds, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, and the ground between the engine and the chassis must be well connected. The DME has detected a voltage value that has exceeded the specified maximum limit for the system to function properly. The vehicle was connected to 24 volts for too long after a jump start. ADC in ECU is defective. Delete stored fault codes from log. If fault reoccurs replace the ECU. Possible Causes: Alternator damaged or faulty Battery voltage low or insufficient Fuses blown or circuits open Battery connection to terminal not clean Voltage regulator has failed
DTC: P0571 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cruise/Brake Switch (A) Circuit Malfunction Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, and the ground between the engine and the chassis must be well connected. The DME has detected a voltage value that is implausible or erratic. Possible Causes: Brake light switch is faulty Control circuit is shorted to chassis ground
DTC: P0600 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Serial Communication Link (Data BUS) Message Missing Conditions: The Engine Control Module (DME) communicates with all databus-capable control modules via a CAN databus. These databus-capable control modules are connected via two data bus wires which are twisted together (CAN_High and CAN_Low), and exchange information (messages). Missing information on the databus is recognized as a malfunction and stored. Trouble-free operation of the CAN-Bus requires that it have a terminal resistance. This central terminal resistor is located in the Engine Control Module (DME). Possible Causes: • CAN data bus wires have short circuited to each other
DTC: P0601 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Internal Control Module Memory Check Sum Error Conditions: Key on, the DME has detected a programming error. The RAM and ROM check displays an invalid check-sum at power up/down. Possible Causes: Battery terminal corrosion, or loose battery connection Connection to the DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Remember to check for Aftermarket Performance Products before replacing a DME.
DTC: P0603 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	DME Keep Alive Memory Test Error Conditions: Key on, and the DME detected an internal memory fault. This code will set if KAPWR to the DME is interrupted (at the initial key on). Watchdog on. Possible Causes: Battery terminal corrosion, or loose battery connection KAPWR to DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Remember to check for Aftermarket Performance Products before replacing a DME.

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P0604 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Watchdog on. Possible Causes: Battery terminal corrosion, or loos Connection to the DME interrupte	ory fault. This code will set if KAPWR to the DME is interrupted (at the initial key on). e battery connection
DTC: P0627 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Pump "A" Control Circuit/Open: The DME detected a high condition on the pur Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring	η ρ .
DTC: P0628 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Pump "A" Control Circuit/Low: The DME detected a high condition on the pur Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring	пр.
DTC: P0629 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Pump "A" Control Circuit/High: The DME detected a high condition on the pun Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring	np.
DTC: P0646 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	A/C Compressor Circuit High Conditions The DME detected a high condition on the ser Possible Causes: • The A/C Compressor has failed. • The DME has failed • Check wiring	
DTC: P0647 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	A/C Compressor Circuit Low Conditions: The DME detected a low condition on the sens Possible Causes: • The A/C Compressor has failed. • The DME has failed • Check wiring	
DTC: P0704 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	daytime driving lights off), automatic transmis	11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park, and the ground between the engine and the chassis must coutside the normal performance range to allow the system to properly function. are corroded or ingresses of water other, to battery or ground Pressure Sensor 1 has failed aulty Sensor has failed Sensor has failed aulty Module (DME) is faulty

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P0705 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	TR Sensor Circuit Malfunction Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, and the ground between the engine and the chassis must be well connected. The DME detected a voltage or signal outside the normal performance range to allow the system to properly function. The engine speed is between 200 and 440rpm. Possible Causes: Circuit harness connector contacts are corroded or ingresses of water Circuit wires have shorted to each other, to battery or ground Automatic Transmission Hydraulic Pressure Sensor 1 has failed Solenoid valves in valve body are faulty Transmission Input Speed (RPM) Sensor has failed Transmission Output Speed (RPM) Sensor has failed Engine Control Module (DME) is faulty Voltage supply for Engine Control Module (DME) is faulty Transmission Control Module (TCM) is faulty
DTC: P0712 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Oil Temperature Sensor Circuit Low Input Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, and the ground between the engine and the chassis must be well connected. The DME detected the oil temperature sensor was less than its minimum self-test range in the test. Possible Causes: Sensor signal circuit is open between the sensor and DME Sensor ground circuit is open between sensor and DME Sensor is damaged or has failed
DTC: P0713 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Oil Temperature Sensor Circuit High Input Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, and the ground between the engine and the chassis must be well connected. The DME detected the oil temperature sensor was more than its maximum self-test range in the test. Possible Causes: Sensor signal circuit is open between the sensor and DME Sensor ground circuit is open between sensor and DME Sensor is damaged or has failed
DTC: P0721 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	A/T Output Shaft Speed Sensor Noise Interference Conditions: Engine started, VSS signal more than 1 mph, and the DME detected "noise" interference on the Output Shaft Speed (OSS) sensor circuit. The calculation of the road speed impossible, as the indicated speed is less than the minimum road speed value and the timer expired. Possible Causes: After market add-on devices interfering with the OSS signal OSS connector is damaged, loose or shorted, or the wiring is misrouted or it is damaged OSS assembly is damaged or it has failed Failure of the ABS CAN vehicle speed sensor

Gas Engine OBD II Trouble Code List (P1xxx Codes)

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P1104	Manifold Pressure Sensor Plausibility Conditions:	
2T CCM, MIL: Yes	Engine started, battery voltage must be at least 11v, and the differential pressure sensor detected a control deviation at the minimum	
Years: 2007, 2008	limit. The closed loop control of the pressure in the intake manifold is suspended and replaced by a direct specification. The MAP	
Models: Cooper	was too low (less than 105.0016kPa); engine stopped.	
Engines: 1.6L, 1.6L Turbo	Possible Causes:	
Transmissions: All	 Sensor's voltage supply on Terminal 87 	
	 Sensor's ground connection faulty 	
	Signal wire to DME faulty	
	Replace sensor	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P1106 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Manifold Pressure Too Low at Full Loa Engine started, battery voltage must be at leas limit. The closed loop control of the different The engine speed is less than 4000rpm. The Possible Causes: Sensor's voltage supply on Term Sensor's ground connection fault Signal wire to DME faulty Replace sensor	at 11v, and the differential pressure sensor detected a control deviation at the minimum al pressure in the intake manifold is suspended and replaced by a direct specification. manifold pressure is less than 600hPa.
DTC: P1107 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All		at 11v, and the differential pressure sensor detected a control deviation at the minimum al pressure in the intake manifold is suspended and replaced by a direct specification. manifold pressure is less than 120hPa.
DTC: P1108 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Engine started, battery voltage must be at leas	nal 87
DTC: P1109 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All		t 11v, and the differential pressure sensor detected a control deviation at the minimum al pressure in the intake manifold is suspended and replaced by a direct specification. he manifold pressure is greater than 600hPa.
DTC: P1122 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	connected, the DME detected that the acceleration Note: Both the Throttle Position (TP) Sensor	all electrical components off, ground connections between engine and chassis well stor pedal position sensor signal was outside the parameters to function normally. and Accelerator Pedal Position Sensor are located at the accelerator pedal module the DME completely independently of each other. Both sensors are stored in one sis may be broken at a failed ary have shorted

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P1123 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Accelerator Pedal Position Sensor 'D' Circuit High Input Conditions: Engine started, battery voltage at least 11.5v, all electrical components off, ground connections between engine and chassis well connected, the DME detected that the accelerator pedal position sensor signal was outside the parameters to function normally. Note: Both the Throttle Position (TP) Sensor and Accelerator Pedal Position Sensor are located at the accelerator pedal module and communicate the driver's intentions to the DME completely independently of each other. Both sensors are stored in one housing. Possible Causes: Ground between engine and chassis may be broken Throttle position sensor may have failed Accelerator Pedal Position Sensor has failed Throttle position sensor wiring may have shorted Throttle position sensor has failed Faulty voltage supply	
DTC: P1125 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Throttle/Pedal Position Sensor Circuit Small Plausibility Error Conditions: Engine started, at idle, the temperature must be at least 80 degrees Celsius. The throttle position sensor supplies implausible signal to the DME. The difference between the TPS1 and the TPS2 is greater than five percent. Possible Causes: TP sensor signal circuit open (inspect wiring & connector) TP sensor signal shorted to ground (inspect wiring & connector) TP sensor is damaged or has failed Throttle control module's voltage supply is shorted or open	
DTC: P1126 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Throttle/Pedal Position Sensor Circuit Large Plausibility Error Conditions: Engine started, at idle, the temperature must be at least 80 degrees Celsius. The throttle position sensor supplies implausible sign to the DME. The difference between the TPS1 and the TPS2 is greater than five percent. Possible Causes: • TP sensor signal circuit open (inspect wiring & connector) • TP sensor signal shorted to ground (inspect wiring & connector) • TP sensor is damaged or has failed • Throttle control module's voltage supply is shorted or open	
DTC: P1143 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to daytime driving lights off), automatic transmission selector must be in park. The DME detected an unexpected voltage condition detected an unexpected current draw in the heater circuit during the CCM test. Coolant temperature must been at least 80.25 de Celsius. The vehicle speed is greater than 27.96 and less than 80.76. The engine speed is between 1984 and 3647rpm. Ambien pressure is greater than 75.001kPa and the engine stability load is 6.94g/s. Note: Vehicle must be raised before connector for oxygen sensors is accessible. Possible Causes: Oxygen sensor (before catalytic converter) is faulty Oxygen sensor heater (before catalytic converter) is faulty Oxygen sensor heater (before catalytic converter) is faulty Oxygen sensor heater (behind catalytic converter) is faulty Oxygen sensor heater (behind catalytic converter) is faulty	
DTC: P1144 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	O2 Sensor Signal Stuck Rich Bank 1 Sensor 2 Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park. The DME detected an unexpected voltage condition, or idetected an unexpected current draw in the heater circuit during the CCM test. Coolant temperature must been at least 80.25 degrees Celsius. The vehicle speed is greater than 27.96 and less than 80.76. The engine speed is between 1984 and 3647rpm. Ambient pressure is greater than 75.001kPa and the engine stability load is 6.94g/s. Note: Vehicle must be raised before connector for oxygen sensors is accessible. Possible Causes: Oxygen sensor (before catalytic converter) is faulty Oxygen sensor heater (before catalytic converter) is faulty Oxygen sensor heater (before catalytic converter) is faulty Oxygen sensor heater (behind catalytic converter) is faulty Oxygen sensor heater (behind catalytic converter) is faulty	

DTC	Trankla	Code Title, Conditions & Resoible Courses
		Code Title, Conditions & Possible Causes
DTC: P1222 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	connected, the DME detected that the acceler Note: Both the Throttle Position (TP) Senso	all electrical components off, ground connections between engine and chassis well ator pedal position sensor signal was outside the parameters to function normally. and Accelerator Pedal Position Sensor are located at the accelerator pedal module the DME completely independently of each other. Both sensors are stored in one sis may be broken e failed r has failed ay have shorted
	Faulty voltage supply	
DTC: P1223 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	connected, the DME detected that the acceler Note: Both the Throttle Position (TP) Sensor	Circuit High Input Conditions: all electrical components off, ground connections between engine and chassis well ator pedal position sensor signal was outside the parameters to function normally. and Accelerator Pedal Position Sensor are located at the accelerator pedal module the DME completely independently of each other. Both sensors are stored in one
Transmissions. All	Possible Causes: Ground between engine and chase Throttle position sensor may have Accelerator Pedal Position Sensor Throttle position sensor wiring mathrottle position sensor has faile Faulty voltage supply	failed r has failed ay have shorted
DTC: P1224 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmi Throttle Position 'B' (TPE) sensors disagreed should not be in its detected position during Note: Both the Throttle Position (TP) Senso	t 11.5v, all electrical components must be off, parking brake must be engaged (to keep ssion selector must be in park; and the DME detected the Throttle Position 'D' (TPD) and or that the TPD sensor should not be in its detected position, or that the TPE sensor esting. and Accelerator Pedal Position Sensor are located at the accelerator pedal module he DME completely independently of each other. Both sensors are stored in one ged or shorted gether in the wire harness orted to VREF (5v)
DTC: P1229 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Throttle/Pedal Position Sensor Adapta Engine started, at idle, the temperature must	ion Outside Tolerance Conditions: e at least 80 degrees Celsius. The throttle position sensor supplies implausible signal nce. The measured max/min TPS values within the limits is greater than 0.0244 volts. pect wiring & connector) d (inspect wiring & connector) d
DTC: P1234 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Electrical Fuel Pump Circuit Short to B The DME detected a low condition on the pur Possible Causes: The fuel pump has failed. The DME has failed Check wiring	
DTC: P1236 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Electrical Fuel Pump Short to Ground of The DME detected a high condition on the purpossible Causes: The fuel pump has failed. The DME has failed. Check wiring	

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P1320 2T MISFIRE, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Misfire Detected Crankshaft Segment Adaptation Conditions: Engine running under positive torque conditions, and the DME detected a misfire or uneven engine function as well as the crankshaft adaptation at its limit. Note: If the misfire is severe, the MIL will flash on/off on the 1st trip! Possible Causes: Air leak in the intake manifold, or in the EGR or DME system Base engine mechanical problem Fuel delivery component problem (i.e., a contaminated, dirty or sticking fuel injector) Fuel pump relay defective Ignition coil fuses have failed Ignition system problem (dirty damaged coil or plug) Engine speed (RPM) sensor has failed Camshaft position sensors have failed Ignition coil is faulty Spark plugs are not working properly or are not gapped properly	
DTC: P1321 2T MISFIRE, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Misfire Crank Wheel Tooth Count Conditions: Engine running under positive torque conditions, and the DME detected a misfire or uneven engine function as well as a tooth error of plus or minus one or two teeth during the count. Note: If the misfire is severe, the MIL will flash on/off on the 1st trip! Possible Causes: Air leak in the intake manifold, or in the EGR or DME system Base engine mechanical problem Fuel delivery component problem (i.e., a contaminated, dirty or sticking fuel injector) Fuel pump relay defective Ignition coil fuses have failed Ignition system problem (dirty damaged coil or plug) Engine speed (RPM) sensor has failed Camshaft position sensors have failed Ignition coil is faulty Spark plugs are not working properly or are not gapped properly	
DTC: P1366 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Ignition Coilpack A Primary/Secondary Circuit Malfunction Open Circuit/Short to Ground Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park and the ground between the engine and the chassis must be well connected. The DME did not receive any valid pulses from the ignition module for the Ignition Coilpack A primary circuit. Note: Ignition coils and power output stages are one component and cannot be replaced individually. Possible Causes: Engine speed (RPM) sensor has failed Camshaft Position (CMP) sensor has failed Power Supply Relay is shorted to an open circuit There is a malfunction in voltage supply Ignition coilpack is damaged or it has failed Cylinder 1 to 4 Fuel Injector(s) have failed	
DTC: P1367 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Ignition Coilpack A Primary/Secondary Circuit Malfunction Open Circuit/Short to Ground Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park and the ground between the engine and the chassis must be well connected. The DME did not receive any valid pulses from the ignition module for the Ignition Coilpack A primary circuit. Note: Ignition coils and power output stages are one component and cannot be replaced individually. Possible Causes: Engine speed (RPM) sensor has failed Camshaft Position (CMP) sensor has failed Power Supply Relay is shorted to an open circuit There is a malfunction in voltage supply Ignition coilpack is damaged or it has failed Cylinder 1 to 4 Fuel Injector(s) have failed	
DTC: P1407 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level Signal 1: The DME detected a high condition on the pump. Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P1409 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level 1 CAN Error: The DME detected a high condition on the pu Possible Causes: • The fuel pump has failed. • The DME has failed • Check wiring	
DTC: P1433 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level Sensor 2 (FSTEsig) CAN Signature The DME detected a high condition on the purpossible Causes: The fuel pump has failed. The DME has failed Check wiring	
DTC: P1434 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	degrees Celsius, and the ambient pressure is degrees Celsius. The change in barometric properties of the purge valve has opened edetected a large leak in the system during the possible Causes: • Aftermarket EVAP hardware non-	t 11.5v, all electrical components must be off. The coolant temperature is less than 60 greater than 76.2994kPa. The air intake temperature at start is between 9.04 and 16.04 essure since engine start is less than 0.9998kPa. The vehicle speed is less than ough on previous driving cycle. The DME detected multiple small fuel vapor leaks; or it leak test. onforming to specifications r purge outlet tube or EVAP return tube disconnected or cracked, or canister is damaged losed, or canister damaged tightened) or the wrong part ctions to EVAP components open
DTC: P1436 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmic catalytic converter and the cylinder head, coo oxygen sensors before the catalytic converter be well connected. The DME detected voltage Possible Causes: • EVAP LDP power supply circuit is • EVAP LDP solenoid valve is dama • EVAP LDP canister has a leak or • EVAP canister system has an imp • Evaporative Emission (EVAP) can • Leak Detection Pump (LDP) is fat • Aftermarket EVAP parts that do not	t 11.5v, all electrical components must be off, parking brake must be engaged (to keep sion selector must be in park, the exhaust system must be properly sealed between the ant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for must be functioning properly and the ground between the engine and the chassis must irregularity in the leak detection pump control circuit. open ged or it has failed poor seal oper seal ster purge regulator valve 1 has failed lty t conform to specifications e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor
DTC: P1437 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	pump circuit. The reed switch level stays low coolant temperature is less than 60 degrees G at start is between 9.04 and 16.04 degrees G vehicle speed is less than 74.56mph, and the Possible Causes: • Leak Detection Pump has failed • EVAP canister system has an imp • Evaporative Emission (EVAP) can • Hoses between the fuel pump and • Fuel filler cap is loose • Fuel pump seal is defective, faulty • Hoses between the EVAP canister	detected an unexpected voltage condition on the EVAP emission control leak detection after activation of solenoids within the time threshold of more than 1 second. The elsius, and the ambient pressure is greater than 76.2994kPa. The air intake temperature sius. The change in barometric pressure since engine start is less than 0.9998kPa. The purge valve has opened enough on previous driving cycle. Toper or broken seal ster purge regulator valve 1 is faulty the EVAP canister are faulty or otherwise leaking

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P1442 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Leak Detection Pump Control Circuit Low Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal
	 Evaporative Emission (EVAP) canister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).
DTC: P1443 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Leak Detection Pump Control Circuit High Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal EVAP canister system has an improper seal Evaporative Emission (EVAP) canister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).
DTC: P1475 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Emission Control LDP Circuit Malfunction Conditions: Key on, KOEO Self-Test enabled, and the DME detected an unexpected voltage condition on the EVAP emission control leak detection pump circuit. The reed switch level stays high after activation of solenoids within the time threshold of more than 0.5 seconds. The coolant temperature is less than 60 degrees Celsius, and the ambient pressure is greater than 76.2994kPa. The air intake temperature at start is between 9.04 and 16.04 degrees Celsius. The change in barometric pressure since engine start is less than 0.9998kPa. The vehicle speed is less than 74.56mph, and the purge valve has opened enough on previous driving cycle. Possible Causes: Leak Detection Pump has failed EVAP canister system has an improper or broken seal Evaporative Emission (EVAP) canister purge regulator valve 1 is faulty Hoses between the fuel pump and the EVAP canister are faulty Fuel filler cap is loose Fuel pump seal is defective, faulty or otherwise leaking Hoses between the EVAP canister and the fuel flap unit are faulty Hoses between the EVAP canister and the evaporative emission canister purge regulator valve are faulty

DTC	Tuobl	Code Title Conditions 9 Passible Course
		Code Title, Conditions & Possible Causes
DTC: P1476 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Key on, KOEO Self-Test enabled, and the Dileak detection pump circuit. There is a clam The coolant temperature is less than 60 degintake temperature at start is between 9.04 a less than 0.9998kPa. The vehicle speed is lecycle. Possible Causes: Leak Detection Pump has failed EVAP canister system has an imp Evaporative Emission (EVAP) car Hoses between the fuel pump and Fuel filler cap is loose Fuel pump seal is defective, fault Hoses between the EVAP canister	ister purge regulator valve 1 is faulty the EVAP canister are faulty y or otherwise leaking
DTC: P1477 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	pump circuit. The reed switch level stays cor 1 second. The coolant temperature is less tha intake temperature at start is between 9.04 an than 0.9998kPa. The vehicle speed is less that Possible Causes: Leak Detection Pump has failed EVAP canister system has an imp Evaporative Emission (EVAP) can Hoses between the fuel pump and Fuel filler cap is loose Fuel pump seal is defective, fault Hoses between the EVAP canister	detected an unexpected voltage condition on the EVAP emission control leak detection inuously low after activation of solenoids within the time threshold of more than n 60 degrees Celsius, and the ambient pressure is greater than 76.2994kPa. The air d 16.04 degrees Celsius. The change in barometric pressure since engine start is less n 74.56mph, and the purge valve has opened enough on previous driving cycle. Toper or broken seal ister purge regulator valve 1 is faulty the EVAP canister are faulty
DTC: P1481 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All DTC: P1482 MIL: No	Cooling Fans Circuit Short to Ground of The DME detected a high condition on the set Possible Causes: • The cooling fan has failed. • The DME has failed • Check wiring Cooling Fans Circuit Short to Battery Company The DME detected a Low condition on the set The DME detected a Low con	nsor. pnditions:
Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Possible Causes:	Onen Circuit Conditions:
MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	The DME detected a high condition on the se Possible Causes: The cooling fan has failed. The DME has failed Check wiring	•
DTC: P1485 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Cooling Fans Circuit Short to Battery C The DME detected a Low condition on the ser Possible Causes: The cooling fan has failed. The DME has failed Check wiring	

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P1496 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Air Intake System Leak (Block 3) Conditions: Engine speed greater than 704rpm. The manifold pressure is greater than 15.002kPa. The throttle position is less than 89.98 percent. The DME detected that a comparison of the modeled mass airflow at the cylinder and the mass airflow at the throttle exceeds the threshold relative to the throttle opening by more than 1.3. Possible Causes: Charge air system leaks Recirculation valve for turbocharger is faulty Turbocharging system is damaged Vacuum diaphragm for turbocharger needs adjusting Wastegate bypass regulator valve is faulty	
DTC: P1572 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	ECM Sensor Supply "A" Noisy Signal: Engine speed greater than 704rpm. The manifold pressure is greater than 15.002kPa. The throttle position is less than 89.98 percent. The DME detected that a comparison of the modeled mass airflow at the cylinder and the mass airflow at the throttle exceeds the threshold relative to the throttle opening by more than 1.3. Possible Causes: Charge air system leaks Recirculation valve for turbocharger is faulty Turbocharging system is damaged Vacuum diaphragm for turbocharger needs adjusting Wastegate bypass regulator valve is faulty	
DTC: P1575 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	ECM Sensor Supply "B" Noisy Signal: Engine speed greater than 704rpm. The manifold pressure is greater than 15.002kPa. The throttle position is less than 89.98 percent. The DME detected that a comparison of the modeled mass airflow at the cylinder and the mass airflow at the throttle exceeds the threshold relative to the throttle opening by more than 1.3. Possible Causes: Charge air system leaks Recirculation valve for turbocharger is faulty Turbocharging system is damaged Vacuum diaphragm for turbocharger needs adjusting Wastegate bypass regulator valve is faulty	
DTC: P1600 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Internal Control Module Random Access Memory (RAM) Error Conditions: Key on, and the DME detected an internal memory fault. This code will set if KAPWR to the DME is interrupted (at the initial key on). Watchdog on. Possible Causes: Battery terminal corrosion, or loose battery connection Connection to the DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Remember to check for Aftermarket Performance Products before replacing a DME.	
DTC: P1607 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	CAN Bus Error Conditions: Engine started, VSS over 1 mph, and the DME detected a problem in the CAN Bus system during the self-test. Possible Causes: Open/short circuit to ground in the communication wire from the transmission to the DME. The DME has failed	
DTC: P1611 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	MIL Call-Up Circuit, Transmission Control Module Short to Ground Conditions: Engine started, VSS over 1 mph, and the DME detected a problem in the Transmission Control system during the self-test. Possible Causes: Open/short circuit to ground in the communication wire from the transmission to the DME. The DME has failed	
DTC: P1612 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	INSTR Module Error Conditions: Engine started, VSS over 1 mph, and the DME detected a problem in the INSTR Module system during the self-test. Possible Causes: Open/short circuit to ground in the communication wire from the transmission to the DME. The DME has failed	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P1613 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Possible Causes:	detected a problem in the ASC system during the self-test. e communication wire from the transmission to the DME.
DTC: P1615 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Possible Causes:	detected a problem in the SPI Bus system during the self-test. e communication wire from the transmission to the DME.
DTC: P1656 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Timeout EWS (Electronic Immobilizer) Key on the DME detected an electrical malfur ECU or CAN for fault, turn the ignition off and Possible Causes: • Circuit from the MIL to the DME • ECU Failure, BUS system failure • Circuit from the EPC to the DME • Defective CAS	ction regarding the EWS. The wrong message was received. Check the EWS fuse, the
DTC: P1661 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Timeout EWS (Electronic Immobilizer) Key on the DME detected an electrical malfur ignition off and then on to repeat start calibra Possible Causes: Circuit from the MIL to the DME ECU Failure, BUS system failure Circuit from the EPC to the DME Defective CAS	ction regarding the EWS. Check the EWS fuse, the ECU or CAN for fault, turn the
TC: P1679 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Torque Losses Condition Key on, engine running, the DME has detecte threshold map during the first 360 ms of oper Possible Causes: • Battery terminal corrosion, loose • Connection to the DME interrupte • Reprogramming error has occurre and needs replacement. • Voltage supply for Engine Contro	t that there is an error in the torque loss calculation. The limit was exceeded in the ation. pattery connection, or faulty d, or the circuit has been opened d
DTC: P1680 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of A to D Conversion Condit Key on, engine running to at least 1200rpm, t 0.273 volts. Possible Causes: • Battery terminal corrosion, loose • Connection to the DME interrupte • Reprogramming error has occurre and needs replacement. • Voltage supply for Engine Contro	ne DME has detected that the PVS ratio differences exceeds the threshold greater than pattery connection, or faulty d, or the circuit has been opened d
DTC: P1681 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Engine Speed Conditions Key on, engine running to at least 1200rpm, t Possible Causes: Battery terminal corrosion, loose Connection to the DME interrupte Reprogramming error has occurre and needs replacement. Voltage supply for Engine Contro	ne DME has detected that the engine speed difference exceeds the threshold of 576rpm pattery connection, or faulty d, or the circuit has been opened d

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P1682 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Idle Speed Control, Monitoring of the Proportional Derivative Conditions: Key on, engine running to at least 1200rpm, the DME has detected that there is an error in the torque demand from the proportional derivative part. The maximum limit has been exceeded. Possible Causes: Battery terminal corrosion, loose battery connection, or faulty Connection to the DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Voltage supply for Engine Control Module (DME) is faulty	
DTC: P1683 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Idle Speed Control, Monitoring of the Integral Part Conditions: Key on, engine running to at least 1200rpm, the DME has detected that there is an error in the torque demand from the integral part greater than 25NM. Possible Causes: Battery terminal corrosion, loose battery connection, or faulty Connection to the DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Voltage supply for Engine Control Module (DME) is faulty	
DTC: P1684 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Minimum Torque at Clutch Conditions: Key on, engine running, the DME has detected that there is an error in the minimum torque at the clutch calculation. The limit was exceeded in the threshold map. Possible Causes: Battery terminal corrosion, loose battery connection, or faulty Connection to the DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Voltage supply for Engine Control Module (DME) is faulty	
DTC: P1685 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Maximum Torque at Clutch Conditions: Key on, engine running, the DME has detected that there is an error in the maximum torque at the clutch calculation. The limit was exceeded in the threshold map. Possible Causes: Battery terminal corrosion, loose battery connection, or faulty Connection to the DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Voltage supply for Engine Control Module (DME) is faulty	
DTC: P1686 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Pedal Values Conditions: Key on, engine running, the DME has detected that there is an error in pedal value checks. The difference exceeds the threshold may 15.23 to 28.91 percent. Possible Causes: Battery terminal corrosion, loose battery connection, or faulty Connection to the DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Voltage supply for Engine Control Module (DME) is faulty	
DTC: P1687 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Throttle Position Conditions: Key on, engine running, the DME has detected that there is an error in the throttle position sensor ratio calculation by greater than 0.313 volts. Possible Causes: Battery terminal corrosion, loose battery connection, or faulty Connection to the DME interrupted, or the circuit has been opened Reprogramming error has occurred and needs replacement. Voltage supply for Engine Control Module (DME) is faulty	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P1688 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper	Monitoring of Mass Airflow Conditions	
Engines: 1.6L, 1.6L Turbo Transmissions: All	Battery terminal corrosion, loose Connection to the DME interrupt Reprogramming error has occurred and needs replacement. Voltage supply for Engine Control	ed, or the circuit has been opened ed
DTC: P1689 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Actual Indicated Engine	Torque Conditions: d that there is an error in the maximum torque at the clutch calculation. The limit was M. battery connection, or faulty d, or the circuit has been opened
DTC: P1691 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Engine Speed Limit in L	mp Home Conditions: d that monitoring of the engine speed limit in limp home condition exceeds the battery connection, or faulty d, or the circuit has been opened
DTC: P1692 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Processor Calculations (onditions: d that there is an error in the for the final request for disabled power stages of MTC pattery connection, or faulty d, or the circuit has been opened d
DTC: P1693 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Monitoring of Processor Calculations (onditions: It that there is an error in the for the temporary request for disabled power stages of pattery connection, or faulty It, or the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened It is a part of the circuit has been opened
DTC: P1698 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	ECU Functionality Incorrect Conditions	nternal errors. This test is performed by the GIB (Gearbox Interface Box), a system ion control unit.

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P1699 1T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: All Transmissions: A/T	EPROM Checksum Incorrect Conditions: The EPROM Checksum is incorrect. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to low level contro of the transmission control unit. Possible Causes: Short to battery Short to ground Open circuit CAN data bus wires have short circuited to each other ECU has failed BUS system failure Defective bus controller (EGS)	
DTC: P1705 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	LED Drives Plausibility Conditions: Key on or engine running; and the DME detected an implausible signal (fault performed by the Gearbox Interface Box). The battery voltage is greater than 9 volts and the CAN Bus is operational. Possible Causes: Short to battery Short to ground Open circuit CAN data bus wires have short circuited to each other ECU has failed BUS system failure Defective bus controller (EGS)	
DTC: P1706 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	LED Drives Short Circuit Conditions: Key on or engine running; and the DME detected short circuit (fault performed by the Gearbox Interface Box). The battery voltage is greater than 9 volts and the CAN Bus is operational. Possible Causes: Short to battery Short to ground Open circuit CAN data bus wires have short circuited to each other ECU has failed BUS system failure Defective bus controller (EGS)	
DTC: P1739 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Clutch Solenoid Circuit Communication Error Conditions: The clutch solenoid circuit signal is implausible or missing. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to low level control of the transmission control unit. Possible Causes: Short to battery Short to ground Open circuit	
DTC: P1741 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Clutch Solenoid Circuit Open Circuit Conditions: The clutch solenoid circuit continuity is in error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to low level control of the transmission control unit. Possible Causes: Short to battery Short to ground Open circuit	
DTC: P1742 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Clutch Solenoid Circuit Short Circuit Conditions: The clutch solenoid circuit continuity is in error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to low level control of the transmission control unit. Possible Causes: Short to battery Short to ground Open circuit	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P1749 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Secondary Pressure Solenoid Circuit (ommunication Error Conditions: ausible or missing. This test is performed by the GIB (Gearbox Interface Box), a system
DTC: P1751 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Secondary Pressure Circuit Open Circi The Secondary Pressure circuit continuity is low level control of the transmission control Possible Causes: Short to battery Short to ground Open circuit	n error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to
DTC: P1752 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Secondary Pressure Solenoid Circuit S The Secondary Pressure circuit continuity is low level control of the transmission control Possible Causes: • Short to battery • Short to ground • Open circuit	n error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to
DTC: P1785 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Secondary Pressure Solenoid Circuit S The Secondary Pressure circuit continuity is low level control of the transmission control Possible Causes: • Short to battery • Short to ground • Open circuit	n error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to
DTC: P1786 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Secondary Pressure Solenoid Circuit S The Secondary Pressure circuit continuity is low level control of the transmission control Possible Causes: Short to battery Short to ground Open circuit	n error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to
DTC: P1787 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Secondary Pressure Solenoid Circuit S The Secondary Pressure circuit continuity is low level control of the transmission control Possible Causes: Short to battery Short to ground Open circuit	n error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to
DTC: P1788 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Secondary Pressure Solenoid Circuit S The Secondary Pressure circuit continuity is low level control of the transmission control of Possible Causes: Short to battery Short to ground Open circuit	n error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to
DTC: P1789 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: A/T	Secondary Pressure Solenoid Circuit S The Secondary Pressure circuit continuity is low level control of the transmission control of Possible Causes: Short to battery Short to ground Open circuit	n error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to

DTC	Trouble Code Title, Conditions & Possible Causes		
DTC: P1815	Secondary Pressure Solenoid Circuit Short Circuit Conditions:		
2T CCM, MIL: Yes	The Secondary Pressure circuit continuity is in error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to		
Years: 2007, 2008	low level control of the transmission control unit.		
Models: Cooper	Possible Causes:		
Engines: 1.6L, 1.6L Turbo	Short to battery		
Transmissions: A/T	Short to ground		
	Open circuit		
DTC: P1816	Secondary Pressure Solenoid Circuit Short Circuit Conditions:		
2T CCM, MIL: Yes	The Secondary Pressure circuit continuity is in error. This test is performed by the GIB (Gearbox Interface Box), a system dedicated to		
Years: 2007, 2008	low level control of the transmission control unit.		
Models: Cooper	Possible Causes:		
Engines: 1.6L, 1.6L Turbo	Short to battery		
Transmissions: A/T	Short to ground		
	Open circuit		

Gas Engine OBD II Trouble Code List (P2xxx Codes)

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P2065 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level Sensor "B" Circuit: The DME detected a high condition on the pump. Possible Causes: • The fuel pump has failed. • Short to positive • Check wiring
DTC: P2067 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Fuel Level Sensor "B" Circuit Low: The DME detected a high condition on the pump. Possible Causes: • The fuel pump has failed. • Short to ground • Check wiring
DTC: P2088 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	"A" Camshaft Position Actuator Control Circuit Low (Bank 1): The DME detected a high condition on the pump. Possible Causes: Short to positive VANOS intake-side solenoid valve. Check wiring DME
DTC: P2089 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	"A" Camshaft Position Actuator Control Circuit/Open (Bank 1): The DME detected a high condition on the pump. Possible Causes: Short to positive VANOS Intake-side solenoid valve. Check wiring DME
DTC: P2090 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	"B" Camshaft Position Actuator Control Circuit High (Bank 1): The DME detected a high condition on the pump. Possible Causes: Short to positive VANOS exhaust-side solenoid valve. Check wiring DME
DTC: P2091 MIL: No Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	"B" Camshaft Position Actuator Control Circuit Low (Bank 1): The DME detected a high condition on the pump. Possible Causes: Short to positive VANOS exhaust-side solenoid valve. Check wiring DME

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P2096	Post Catalyst Fuel Trim System Too Le	an (Bank 1) Conditions:
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	chassis must be well connected, the exhaust and the oxygen sensor heater for oxygen sen problem with the fuel mixture. Trim control 1 threshold of less than —1.56. Coolant tempe but the rear O2 sensor is in voltage outside the sensor is in voltage.	ng, oxygen sensor should be cooled to ambient temperature. High temperatures at urements. onverter) is faulty converter) is faulty alytic converter) is faulty alytic converter) is faulty alytic converter) is faulty
DTC: DODOZ		
DTC: P2097 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	chassis must be well connected, the exhaust and the oxygen sensor heater for oxygen sensor problem with the fuel mixture. Trim control 1 threshold of less than —1.56. Coolant tempe but the rear O2 sensor is in voltage outside the	t 11.5v, all electrical components must be off, the ground between the engine and the system must be properly sealed between the catalytic converter and the cylinder head, or before the catalytic converter must be properly functioning. The DME detected a segment (precision controller with oxygen sensor behind cat.) below delta lambda ature greater than 45 degrees Celsius. O2 heaters ready, fuel system in a closed loop, e parameters. g, oxygen sensor should be cooled to ambient temperature. High temperatures at
	Oxygen sensor (before catalytic descriptions)	poverter) is faulty
	 Oxygen sensor (behind catalytic of the control of the catalytic o	onverter) is faulty lytic converter) is faulty alytic converter) is faulty
DTC: P2122	Accelerator Pedal Position Sensor 'D'	Circuit Low Input Conditions:
2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Engine started, battery voltage at least 11.5v, connected, the DME detected that the acceleration (TP) Sensor	all electrical components off, ground connections between engine and chassis well tor pedal position sensor signal was outside the parameters to function normally. and Accelerator Pedal Position Sensor are located at the accelerator pedal module he DME completely independently of each other. Both sensors are stored in one
	 Ground between engine and chas 	sis may he hroken
	 Throttle position sensor may have Accelerator Pedal Position Senso Throttle position sensor wiring m Throttle position sensor has failed Faulty voltage supply 	failed has failed ay have shorted
DTC: P2123 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	connected, the DME detected that the accelera Note: Both the Throttle Position (TP) Sensor	ircuit High Input Conditions: Il electrical components off, ground connections between engine and chassis well tor pedal position sensor signal was outside the parameters to function normally. and Accelerator Pedal Position Sensor are located at the accelerator pedal module he DME completely independently of each other. Both sensors are stored in one
	Possible Causes: Ground between engine and chass Throttle position sensor may have Accelerator Pedal Position Sensor Throttle position sensor wiring mathrottle position sensor has failed Faulty voltage supply	failed has failed y have shorted

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P2127 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Accelerator Pedal Position Sensor 'E' Circuit Low Input Conditions: Engine started, battery voltage at least 11.5v, all electrical components off, ground connections between engine and chassis well connected, the DME detected that the accelerator pedal position sensor signal was outside the parameters to function normally. Note: Both the Throttle Position (TP) Sensor and Accelerator Pedal Position Sensor are located at the accelerator pedal module and communicate the driver's intentions to the DME completely independently of each other. Both sensors are stored in one housing. Possible Causes: • Ground between engine and chassis may be broken • Throttle position sensor may have failed • Accelerator Pedal Position Sensor has failed • Throttle position sensor wiring may have shorted • Throttle position sensor has failed • Faulty voltage supply	
DTC: P2128 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Accelerator Pedal Position Sensor 'E' Circuit High Input Conditions: Engine started, battery voltage at least 11.5v, all electrical components off, ground connections between engine and chassis well connected, the DME detected that the accelerator pedal position sensor signal was outside the parameters to function normally. Note: Both the Throttle Position (TP) Sensor and Accelerator Pedal Position Sensor are located at the accelerator pedal module and communicate the driver's intentions to the DME completely independently of each other. Both sensors are stored in one housing. Possible Causes: • Ground between engine and chassis may be broken • Throttle position sensor may have failed • Accelerator Pedal Position Sensor has failed • Throttle position sensor wiring may have shorted • Throttle position sensor has failed • Faulty voltage supply	
DTC: P2138 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Throttle Position Sensor D/E Voltage Correlation Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park; and the DME detected the Throttle Position 'D' (TPD) an Throttle Position 'B' (TPE) sensors disagreed, or that the TPD sensor should not be in its detected position during testing. Note: Both the Throttle Position (TP) Sensor and Accelerator Pedal Position Sensor are located at the accelerator pedal module and communicate the driver's intentions to the DME completely independently of each other. Both sensors are stored in one housing. Possible Causes: • ETC TP sensor connector is damaged or shorted • ETC TP sensor circuits shorted together in the wire harness • ETC TP sensor is damaged or the DME has failed	
DTC: P2177 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	System Too Lean Off Idle (Bank 1): Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park; and the DME detected the Throttle Position 'D' (TPD) and Throttle Position 'B' (TPE) sensors disagreed, or that the TPD sensor should not be in its detected position, or that the TPE sensor should not be in its detected position, or that the TPE sensor should not be in its detected position (TP) Sensor and Accelerator Pedal Position Sensor are located at the accelerator pedal module and communicate the driver's intentions to the DME completely independently of each other. Both sensors are stored in one housing. Possible Causes: • ETC TP sensor connector is damaged or shorted • ETC TP sensor circuits shorted together in the wire harness • ETC TP sensor signal circuit is shorted to VREF (5v) • ETC TP sensor is damaged or the DME has failed	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P2178 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transm Throttle Position 'B' (TPE) sensors disagreed should not be in its detected position during Note: Both the Throttle Position (TP) Sensor	and Accelerator Pedal Position Sensor are located at the accelerator pedal module the DME completely independently of each other. Both sensors are stored in one aged or shorted gether in the wire harness or orded to VREF (5v)
DTC: P2187 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmi Throttle Position 'B' (TPE) sensors disagreed should not be in its detected position during Note: Both the Throttle Position (TP) Sensor	and Accelerator Pedal Position Sensor are located at the accelerator pedal module he DME completely independently of each other. Both sensors are stored in one ged or shorted gether in the wire harness orted to VREF (5v)
DTC: P2188 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	daytime driving lights off), automatic transmi Throttle Position 'B' (TPE) sensors disagreed should not be in its detected position during Note: Both the Throttle Position (TP) Sensor	and Accelerator Pedal Position Sensor are located at the accelerator pedal module he DME completely independently of each other. Both sensors are stored in one ged or shorted pether in the wire harness orted to VREF (5v)
DTC: P2195 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	O2S Signal Biased/Stuck Lean (Bank 1 Engine running, battery voltage 11.5, all elect exhaust system must be properly sealed betw a negative voltage range referred to as "charac measured period of time. In effect, it does not Possible Causes: Wiring fault O2S befor catalytic converter defe	Sensor 1): ical components off, ground between engine and chassis well connected and the en catalytic converter and the cylinder head. The DME detected the H02S signal was in ter shift downward". This code sets when the H02S signal remains in a low state for a switch properly in the closed loop operation. Engine speed is less than 8000rpm.
DTC: P2196 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	exhaust system must be properly sealed betwa negative voltage range referred to as "charac measured period of time. In effect, it does not Possible Causes: Wiring fault O2S befor catalytic converter defe	ical components off, ground between engine and chassis well connected and the en catalytic converter and the cylinder head. The DME detected the HO2S signal was in ter shift downward". This code sets when the HO2S signal remains in a low state for a switch properly in the closed loop operation. Engine speed is less than 8000rpm.

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P2237 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S (Bank 1 Sensor 1) Circuits: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the H02S signal was in a negative voltage range referred to as "character shift downward". This code sets when the H02S signal remains in a low state for a measured period of time. In effect, it does not switch properly in the closed loop operation. Engine speed is less than 8000rpm. Possible Causes: H02S is contaminated (due to presence of silicone in fuel) H02S signal and ground circuit wires crossed in wiring harness H02S signal circuit is shorted to sensor or chassis ground H02S element has failed (internal short condition) Leaks present in the exhaust manifold or exhaust pipes	
DTC: P2243 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S (Bank 1 Sensor 1) Circuit: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the H02S signal was in a negative voltage range referred to as "character shift downward". This code sets when the H02S signal remains in a low state for a measured period of time. In effect, it does not switch properly in the closed loop operation. Engine speed is less than 8000rpm. Possible Causes: H02S is contaminated (due to presence of silicone in fuel) H02S signal and ground circuit wires crossed in wiring harness H02S signal circuit is shorted to sensor or chassis ground H02S element has failed (internal short condition) Leaks present in the exhaust manifold or exhaust pipes	
DTC: P2251 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S (Bank 1 Sensor 1) Circuit: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the H02S signal was ir a negative voltage range referred to as "character shift downward". This code sets when the H02S signal remains in a low state for a measured period of time. In effect, it does not switch properly in the closed loop operation. Engine speed is less than 8000rpm. Possible Causes: H02S is contaminated (due to presence of silicone in fuel) H02S signal and ground circuit wires crossed in wiring harness H02S signal circuit is shorted to sensor or chassis ground H02S element has failed (internal short condition) Leaks present in the exhaust manifold or exhaust pipes	
DTC: P2270 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Rear O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to kee daytime driving lights off), automatic transmission selector must be in park. The DME detected an unexpected voltage condition, or detected an unexpected current draw in the heater circuit during the CCM test. Coolant temperature must been at least 80.25 degree Celsius. The vehicle speed is greater than 27.96 and less than 80.76. The engine speed is between 1984 and 3647rpm. Ambient pressure is greater than 75.001kPa and the engine stability load is 6.94g/s. Note: Vehicle must be raised before connector for oxygen sensors is accessible. Possible Causes: • Rear Oxygen sensor voltage exceeds a calibrated threshold • Rear Oxygen sensor signal permanently lies below or above the set point • Rear Oxygen sensor A/F mixture ia above the set point value	
DTC: P2271 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Rear O2 Sensor Signal Stuck Lean Bank 1 Sensor 2 Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park. The DME detected an unexpected voltage condition, or it detected an unexpected current draw in the heater circuit during the CCM test. Coolant temperature must been at least 80.25 degrees Celsius. The vehicle speed is greater than 27.96 and less than 80.76. The engine speed is between 1984 and 3647rpm. Ambient pressure is greater than 75.001kPa and the engine stability load is 6.94g/s. Note: Vehicle must be raised before connector for oxygen sensors is accessible. Possible Causes: Rear Oxygen sensor voltage exceeds a calibrated threshold Rear Oxygen sensor signal permanently lies below or above the set point Rear Oxygen sensor A/F mixture ia above the set point value	

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P2300 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Ignition Coilpack A Primary/Secondary Engine started, battery voltage must be at lea daytime driving lights off), automatic transm be well connected. The DME did not receive	Circuit Malfunction Open Circuit/Short to Ground Conditions: st 11.5v, all electrical components must be off, parking brake must be engaged (to keep ssion selector must be in park and the ground between the engine and the chassis must any valid pulses from the ignition module for the Ignition Coilpack A primary circuit. s are one component and cannot be replaced individually. failed has failed an open circuit supply thas failed
DTC: P2301 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Engine started, battery voltage must be at lea daytime driving lights off), automatic transmi be well connected. The DME did not receive	has failed an open circuit supply has failed
DTC: P2303 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Engine started, battery voltage must be at lead adytime driving lights off), automatic transmibe well connected. The DME did not receive	has failed an open circuit supply has failed
DTC: P2304 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	Engine started, battery voltage must be at lead daytime driving lights off), automatic transmibe well connected. The DME did not receive a	has failed an open circuit supply has failed

DTC	Trouble Code Title, Conditions & Possible Causes	
DTC: P240A 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Leak Detection Pump (LDP) Heater Control Circuit/Open: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal EVAP canister system has an improper seal Evaporative Emission (EVAP) canister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).	
DTC: P240B 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Leak Detection Pump (LDP) Heater Control Circuit Low: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal EVAP canister system has an improper seal Evaporative Emission (EVAP) canister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).	
DTC: P240C 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Leak Detection Pump (LDP) Heater Control Circuit High: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal EVAP canister system has an improper seal Evaporative Emission (EVAP) canister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).	

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P2400 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Leak Detection Pump (LDP) Control Circuit Open Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal EVAP canister system has an improper seal Evaporative Emission (EVAP) can ister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).
DTC: P2401 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Leak Detection Pump Control Circuit Low Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between th catalytic converter and the cylinder head, coo ant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal Evaporative Emission (EVAP) canister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).
DTC: P2402 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Leak Detection Pump Control Circuit High Conditions: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coo and temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal EVAP canister EVAP; can ster purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).

DTC	Trouble Code Title, Conditions & Possible Causes		
DTC: P2404 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Emission Control LDP Circuit Malfunction Pump Problem Conditions: Key on, KOEO Self-Test enabled, and the DME detected an unexpected voltage condition on the EVAP emission control leak detection pump circuit. The reed switch level stays low after activation of solenoids within the time threshold of more than 1 second. The coolant temperature is less than 60 degrees Celsius, and the ambient pressure is greater than 76.2994kPa. The air intake temperature at start is between 9.04 and 16.04 degrees Celsius. The change in barometric pressure since engine start is less than 0.9998kPa. The vehicle speed is less than 74.56mph, and the purge valve has opened enough on previous driving cycle. Possible Causes: Leak Detection Pump has failed EVAP canister system has an improper or broken seal Evaporative Emission (EVAP) canister purge regulator valve 1 is faulty Hoses between the fuel pump and the EVAP canister are faulty Fuel filler cap is loose Fuel pump seal is defective, faulty or otherwise leaking		
	 Hoses between the EVAP canister and the fuel flap unit are faulty Hoses between the EVAP canister and the evaporative emission canister purge regulator valve are faulty 		
DTC: P2414 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	O2 SensorVoltage Check: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park. The DME detected an unexpected voltage condition, or it detected an unexpected current draw in the heater circuit during the CCM test. Coolant temperature must been at least 80.25 degrees Celsius. The vehicle speed is greater than 27.96 and less than 80.76. The engine speed is between 1984 and 3647rpm. Ambient pressure is greater than 75.001kPa and the engine stability load is 6.94g/s. Note: Vehicle must be raised before connector for oxygen sensors is accessible. Possible Causes: Oxygen sensor not properly mounted in the exhaust system Oxygen sensor VA voltage lies below the maximum or above the calibrated value		
DTC: P2418 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Emission System Switching Valve Control Circuit/Open: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes:		
	 EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal Evaporative Emission (EVAP) canister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve). 		
DTC: P2419 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Emission System Switching Valve Control Circuit Low: Engine started, battery voltage must be at least 11.5v, all electrical components must be off, parking brake must be engaged (to keep daytime driving lights off), automatic transmission selector must be in park, the exhaust system must be properly sealed between the catalytic converter and the cylinder head, coolant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for oxygen sensors before the catalytic converter must be functioning properly and the ground between the engine and the chassis must be well connected. The DME detected voltage irregularity in the leak detection pump control circuit. Possible Causes: EVAP LDP power supply circuit is open EVAP LDP solenoid valve is damaged or it has failed EVAP LDP canister has a leak or a poor seal EVAP canister system has an improper seal EVAP canister system has an improper seal Evaporative Emission (EVAP) canister purge regulator valve 1 has failed Leak Detection Pump (LDP) is faulty Aftermarket EVAP parts that do not conform to specifications EVAP component seals leaking (i.e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor control valve tube assembly or fuel vapor vent valve).		

	0.110 1110 0 D E 2	
DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P2420 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	EVAP Emission System Switching Valv Engine started, battery voltage must be at lea daytime driving lights off), automatic transmi catalytic converter and the cylinder head, coo oxygen sensors before the catalytic converter be well connected. The DME detected voltage Possible Causes: • EVAP LDP power supply circuit is • EVAP LDP solenoid valve is dam • EVAP LDP canister has a leak or • EVAP canister system has an imp • Evaporative Emission (EVAP) can • Leak Detection Pump (LDP) is fat • Aftermarket EVAP parts that do no	e Control Circuit High: st 11.5v, all electrical components must be off, parking brake must be engaged (to keep ssion selector must be in park, the exhaust system must be properly sealed between the lant temperature must be at least 80 degrees Celsius and oxygen sensor heaters for must be functioning properly and the ground between the engine and the chassis must irregularity in the leak detection pump control circuit. s open aged or it has failed a poor seal roper seal ister purge regulator valve 1 has failed litty at conform to specifications e., leaks in the Purge valve, fuel tank pressure sensor, canister vent solenoid, fuel vapor
DTC: P2626 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	exhaust system must be properly sealed betw a negative voltage range referred to as "chara	ires crossed in wiring harness sensor or chassis ground short condition)

Gas Engine OBD II Trouble Code List (P3xxx Codes)

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P3012 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	exhaust system must be properly sealed betw a negative voltage range referred to as "chara	ires crossed in wiring harness ensor or chassis ground short condition)
DTC: P3014 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 1 Sensor 1) Circuit: Engine running, battery voltage 11.5, all elect exhaust system must be properly sealed between a negative voltage range referred to as "characteristics".	ical components off, ground between engine and chassis well connected and the en catalytic converter and the cylinder head. The DME detected the HO2S signal was in ter shift downward". This code sets when the HO2S signal remains in a low state for a switch properly in the closed loop operation. Engine speed is less than 8000rpm. sence of silicone in fuel) res crossed in wiring harness ensor or chassis ground short condition)

DTC	Trouble Code Title, Conditions & Possible Causes
DTC: P3016 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: All Transmissions: All	HO2S (Bank 1 Sensor 1) Heater Circuit Malfunction Conditions: Engine running, battery voltage is between 11 and 16 volts, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected an unexpected voltage condition, or it detected excessive current draw in the heater circuit during the CCM test. The engine load is 25 to 160kg/h. The exhaust gas temperature is between 450 and 700 degrees Celsius. Possible Causes: • H02S heater power circuit is open or heater ground circuit open • H02S signal tracking (due to oil or moisture in the connector) • H02S is damaged or has failed
DTC: P3018 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	HO2S (Bank 1 Sensor 1) Circuit: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the HO2S signal was in a negative voltage range referred to as "character shift downward". This code sets when the HO2S signal remains in a low state for a measured period of time. In effect, it does not switch properly in the closed loop operation. Engine speed is less than 8000rpm. Possible Causes: HO2S is contaminated (due to presence of silicone in fuel) HO2S signal and ground circuit wires crossed in wiring harness HO2S signal circuit is shorted to sensor or chassis ground HO2S element has failed (internal short condition) Leaks present in the exhaust manifold or exhaust pipes
DTC: P3020 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S (Bank 1 Sensor 1) Circuit: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the H02S signal was in a negative voltage range referred to as "character shift downward". This code sets when the H02S signal remains in a low state for a measured period of time. In effect, it does not switch properly in the closed loop operation. Engine speed is less than 8000rpm. Possible Causes: H02S is contaminated (due to presence of silicone in fuel) H02S signal and ground circuit wires crossed in wiring harness H02S signal circuit is shorted to sensor or chassis ground H02S element has failed (internal short condition) Leaks present in the exhaust manifold or exhaust pipes
DTC: P3022 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S (Bank 1 Sensor 1) Circuit: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the H02S signal was it a negative voltage range referred to as "character shift downward". This code sets when the H02S signal remains in a low state for a measured period of time. In effect, it does not switch properly in the closed loop operation. Engine speed is less than 8000rpm. Possible Causes: H02S is contaminated (due to presence of silicone in fuel) H02S signal and ground circuit wires crossed in wiring harness H02S signal circuit is shorted to sensor or chassis ground H02S element has failed (internal short condition) Leaks present in the exhaust manifold or exhaust pipes
DTC: P3024 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	H02S (Bank 1 Sensor 1) Circuit: Engine running, battery voltage 11.5, all electrical components off, ground between engine and chassis well connected and the exhaust system must be properly sealed between catalytic converter and the cylinder head. The DME detected the H02S signal was a negative voltage range referred to as "character shift downward". This code sets when the H02S signal remains in a low state for a measured period of time. In effect, it does not switch properly in the closed loop operation. Engine speed is less than 8000rpm. Possible Causes: H02S is contaminated (due to presence of silicone in fuel) H02S signal and ground circuit wires crossed in wiring harness H02S signal circuit is shorted to sensor or chassis ground H02S element has failed (internal short condition) Leaks present in the exhaust manifold or exhaust pipes

DTC	Trouble	Code Title, Conditions & Possible Causes
DTC: P3026 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: All Transmissions: All	HO2S (Bank 1 Sensor 1) Heater Circuil Engine running, battery voltage is between 1 connected and the exhaust system must be p	Malfunction Conditions: and 16 volts, all electrical components off, ground between engine and chassis well roperly sealed between catalytic converter and the cylinder head. The DME detected an excessive current draw in the heater circuit during the CCM test. The engine load is 25 to ween 450 and 700 degrees Celsius. The or heater ground circuit open
DTC: P2404 2T CCM, MIL: Yes Years: 2007, 2008 Models: Cooper Engines: 1.6L, 1.6L Turbo Transmissions: All	coolant temperature is less than 60 degrees Coat start is between 9.04 and 16.04 degrees Coat start is between the green for the properties of the propertie	detected an unexpected voltage condition on the EVAP emission control leak detection after activation of solenoids within the time threshold of more than 1 second. The elsius, and the ambient pressure is greater than 76.2994kPa. The air intake temperature Isius. The change in barometric pressure since engine start is less than 0.9998kPa. The purge valve has opened enough on previous driving cycle. Toper or broken seal ster purge regulator valve 1 is faulty the EVAP canister are faulty or otherwise leaking

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SPECIFICATIONS AND MAINTENANCE CHARTS

ENGINE AND VEHICLE IDENTIFICATION

B			Engine				Mode	l Year
Code ①	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	Eng. Mfg.	Code ②	Year
W10	1.6 (1598)	97.5	4	NA	DOHC	BMW	6	2006
W11	1.6 (1598)	97.5	4	NA	DOHC	BMW	7	2007
N12	1.6 (1598)	97.5	4	NA	DOHC	BMW	8	2008
N14	1.6 (1598)	97.5	4	NA	DOHC	BMW	<u> </u>	2000

NA: Not available

SOHC: Single Overhead Camshaft

1 8th position of VIN

2 10th position of VIN

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GENERAL ENGINE SPECIFICATIONS

			Engine	ne Net Net B		Bore x	Com-	Oil
			Displacement	Horsepower	Torque @ rpm	Stroke	pression	Pressure
Year	Model	Series	Liters (VIN)	@ rpm	(ft. lbs.)	(in.)	Ratio	@ rpm
2006	Cooper	R50	1.6 (W10)	115@6000	111@4500	3.03x3.37	10.6:1	25-80@3000
	Cooper S	R53	1.6 (W11)	168@6000	162@4000	3.03x3.37	8.3:1	25-80@3000
2007	Cooper	R56	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper S	R56	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper Convertible	R52	1.6 (W10)	115@6000	111@4500	3.03x3.37	10.6:1	25-80@3000
	Cooper S Convertible	R52	1.6 (W11)	168@6000	162@4000	3.03x3.37	8.3:1	25-80@3000
2008	Cooper	R56	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper S	R56	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper Convertible	R52	1.6 (W10)	115@6000	111@4500	3.03x3.37	10.6:1	25-80@3000
	Cooper S Convertible	R52	1.6 (W11)	168@6000	162@4000	3.03x3.37	8.3:1	25-80@3000

ENGINE TUNE-UP SPECIFICATIONS

	LITORIE TORE OF CHILDREN									
		Engine <mark>\$park Plug Ignition Fuel Idle Val</mark> v						lve		
			Displacement	Gap	Timing	Pump	Speed	Clear	rance	
Year	Model	Series	Liters (VIN)	(in.)	(deg.)	(psi)	(rpm)	ln.	Ex.	
2006	Cooper	R50	1.6 (W10)	NA	1	NA	2	HYD	HYD	
	Cooper S	R53	1.6 (W11)	NA	1	NA	2	HYD	HYD	
2007	Cooper	R56	1.6 (N12)	NA	1	NA	2	HYD	HYD	
	Cooper S	R56	1.6 (N14)	NA	1)	NA	2	HYD	HYD	
	Cooper Convertible	R52	1.6 (W10)	NA	1	NA	2	HYD	HYD	
	Cooper S Convertible	R52	1.6 (W11)	NA	1	NA	2	HYD	HYD	
2008	Cooper	R56	1.6 (N12)	NA	1	NA	2	HYD	HYD	
	Cooper S	R56	1.6 (N14)	NA	1	NA	2	HYD	HYD	
	Cooper Convertible	R52	1.6 (W10)	NA	1	NA	2	HYD	HYD	
	Cooper S Convertible	R52	1.6 (W11)	NA	1	NA	2	HYD	HYD	

NOTE: The Vehicle Emission Control Information label often reflects specification changes made during production. The label figures must be used if they differ from those in this chart.

NA: Not available

HYD: Hydraulic

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CAPACITIES

			CAF	V	IIILO				
					Engine				
			Engine		Oil with	Automatic	Manual	Fuel	Cooling
			Displacement		Filter	Transaxle	Transaxle	Tank	System
Year	Model	Series	Liters (VIN)		(qts.)	(qts.)	(qts.)	(gal.)	(qts.)
2006	Cooper	R50	1.6 (W10)		4.8	6.3	1.8	13.2	7
	Cooper S	R53	1.6 (W11)		5.1	5.3	1.8	13.2	7
2007	Cooper	R56	1.6 (N12)		4.4	5.3	1.8	10.6	5.5
	Cooper S	R56	1.6 (N14)		4.4	5.3	1.6	13.2	5.5
	Cooper Convertible	R52	1.6 (W10)		4.8	5.3	1.8	13.2	7
	Cooper S Convertible	R52	1.6 (W11)		5.1	5.3	1.8	13.2	7
2008	Cooper	R56	1.6 (N12)		4.4	5.3	1.8	10.6	, 5.5
	Cooper S	R56	1.6 (N14)		4.4	5.3	1.6	13.2	5.5
	Cooper Convertible	R52	1.6 (W10)		4.8	5.3	1.8	13.2	7
	Cooper S Convertible	R52	1.6 (W11)		5.1	5.3	1.8	13.2	7

① Ignition timing is regulated by the Electronic Control Module (ECM), and cannot be adjusted.

② Idle speed is controled by the Electronic Control Module (ECM), and cannot be adjusted.

TORQUE SPECIFICATIONS

All readings in ft. lbs.

		Engine	Cylinder	Main	Rod	Crankshaft					Oil Pan
		Displacement	Head	Bearing	Bearing	Damper	Flywheel	Manifold		Spark	Drain
Year	Model	Liters (VIN)	Bolts	Bolts	Bolts	Bolts	Bolts	Intake	Exhaust	Plugs	Plug
2006	Cooper	1.6 (W10)	1	2	15	NA	59	19	18	20	18
	Cooper S	1.6 (W11)	1	2	15	NA	66	19	18	20	18
2007	Cooper	1.6 (N12)	3	4	(5)	NA	6	11	18	20	22
	Cooper S	1.6 (N14)	3	4	(5)	NA	(5)	7	18	20	18
	Convertible	1.6 (W10)	1	2	15	NA	59	19	18	20	18
	S Convertible	1.6 (W11)	1	2	15	NA	66	19	18	20	18
2008	Cooper	1.6 (N12)	3	4	(5)	NA	6	7	18	20	22
	Cooper S	1.6 (N14)	3	4	(5)	NA	(5)	19	18	20	18
	Convertible	1.6 (W10)	1	2	15	NA	59	19	18	20	18
	S Convertible	1.6 (W11)	1	2	15	NA	66	19	18	20	18

NA: Not available

① Step 1: Bolts 1 through 10: 30 ft. lbs.

Step: 2 Bolts 1 through 10 tighten an additional 90 degrees

Step: 3 Bolts 11 through 12 21 ft. lbs.

② Inner (M10) bolts: 44 ft. lbs. Outer (M8) bolts: 26 ft. lbs.

③ Step 1: Bolts 1 through 10: 22 ft. lbs.

Step 2: Bolts 1 through 10 tighten an additional 90 degrees

Step 3: Bolts 1 through 10 tighten an additional 90 degrees

Step 4: Bolts 11 through 12: 11 ft. lbs.

Step 5: Bolts 11 through 12 tighten an additional 90 degrees

Step 6: Bolts 11 through 12 tighten an additional 90 degrees

Step 7: Screw replaced and tightened to 22 ft. lbs.

④ Inner (M9) bolts: 22 ft. lbs. plus 150 degrees Outer (M6) bolts: 7 ft. lbs.

⑤ Step 1: 44 inch lbs. Step 2: 132 inch lbs.

Step 3: Plus 90 degrees

6 Step 1: 72 inch lbs.

Step 2: 22 ft.lbs.

Step 3: Plus 90 degrees

7 M8 bolts: 11 ft.lbs. Hexagon nut: 15 ft. lbs.

WHEEL ALIGNMENT

			Caster		Cam			
		-		Preferred		Preferred		
			Range	Setting	Range	Setting	Toe-in	
Year	Model		(+/-Deg.)	(Deg.)	(+/-Deg.)	(Deg.)	(Deg.)	
2006	Cooper	F	NA	1	0.42	-0.50	0.3+/-0.08	
	(R50)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S	F	NA	1	0.42	-0.50	0.3+/-0.08	
	(R53)	R	_	_	0.33	-1.75	0.4+/-0.13	
2007	Cooper	F	NA	1)	0.42	-0.50	0.2+/-0.17	
	(R56)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S	F	NA	1	0.42	-0.50	0.2+/-0.17	
	(R56)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper Convertible	F	NA	1)	0.42	-0.50	0.3+/-0.08	
	(R52)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S Convertible	F	NA	1	0.42	-0.50	0.3+/-0.08	
	(R52)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper	F	NA	1)	0.42	-0.50	0.2+/-0.17	
2008	(R56)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S	F	NA	1)	0.42	-0.50	0.2+/-0.17	
	(R56)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper Convertible	F	NA	1)	0.42	-0.50	0.3+/-0.08	
	(R52)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S Convertible	F	NA	1)	0.42	-0.50	0.3+/-0.08	
	(R52)	R	_	_	0.33	-1.75	0.4+/-0.13	

 $[\]textcircled{1}$ Difference between left/right max. 0.5 degrees

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TIRE, WHEEL AND BALL JOINT SPECIFICATIONS

		OEM	1 Tires	Tire Pressures (psi)			Wheel	Ball	Lug Nut
Year	Model	Standard	Optional		Front	Rear	Size	Joint	(ft. lbs)
2006	Cooper	175/65R15	195/55R1	6	1)	1	15 X 5.5J	NA	103
	Cooper S	195/55R16	205/45R1	7	1)	1	16 X 6.5J	NA	103
2007	Cooper	175/65R15	195/55R1	6	1)	1	15 X 5.5J	N/A	103
	Cooper S	195/55R16	205/45R1	7	1)	1	16 X 6.5J	NA	103
	Cooper Convertible	175/65R15	195/55R1	6	1)	1	15 X 5.5J	NA	103
	Cooper S Convertible	195/55R16	205/45R1	7	1)	1	16 X 6.5J	NA	103
2008	Cooper	175/65R15	195/55R1	6	1	1	15 X 5.5J	NA	103
	Cooper S	195/55R16	205/45R1	7	1	1	16 X 6.5J	NA	103
	Cooper Convertible	175/65R15	195/55R1	6	1	1	15 X 5.5J	NA	103
	Cooper S Convertible	195/55R16	205/45R1	7	1	1	16 X 6.5J	NA	103

OEM: Original Equipment Manufacturer

PSI: Pounds Per Square Inch

 $[\]ensuremath{\textcircled{1}}$ See specification in owners manual

BRAKE SPECIFICATIONS

All measurements in inches unless noted

						Brake	Drum Dia	ameter	Min.	Brake Caliper	
				Brake Disc		Original	Max.	Maximum	Lining	Bracket	Mounting
			Original	Minimum	Maximum	Inside	Wear	Machine	Thick-	Bolts	Bolts
Year	Model		Thickness	Thickness	Run-out	Diameter	Limit	Diameter	ness	(ft. lbs.)	(ft. lbs.)
2006	R50	F	NA	1	NA	NA	NA	NA	NA	81	22-26
		R	NA	1	NA	NA	NA	NA	NA	48	22-26
	R52	F	NA	1	NA	NA	NA	NA	NA	81	22-26
		R	NA	1	NA	NA	NA	NA	NA	48	22-26
	R53	F	NA	1	NA	NA	NA	NA	NA	81	22-26
		R	NA	1	NA	NA	NA	NA	NA	48	22-26
2007	R52	F	NA	1	NA	NA	NA	NA	NA	81	22-26
		R	NA	1	NA	NA	NA	NA	NA	48	22-26
	R55	F	NA	1	NA	NA	NA	NA	NA	81	26
		R	NA	1	NA	NA	NA	NA	NA	48	26
	R56	F	NA	1	NA	NA	NA	NA	NA	81	26
		R	NA	1	NA	NA	NA	NA	NA	48	26
2008	R52	F	NA	1	NA	NA	NA	NA	NA	81	22-26
		R	NA	1	NA	NA	NA	NA	NA	48	22-26
	R55	F	NA	1	NA	NA	NA	NA	NA	81	26
		R	NA	1	NA	NA	NA	NA	NA	48	26
	R56	F	NA	1	NA	NA	NA	NA	NA	81	26
		R	NA	1	NA	NA	NA	NA	NA	48	26

F: Front

R: Rear

NA: Not available

 $\ensuremath{ \textcircled{\scriptsize 1}}$ Minimum thickness is stamped in the brake disc shell

PRECAUTIONS

Before servicing any vehicle, please be sure to read all of the following precautions, which deal with personal safety, prevention of component damage, and important points to take into consideration when servicing a motor vehicle:

- Never open, service or drain the radiator or cooling system when the engine is hot; serious burns can occur from the steam and hot coolant.
- Observe all applicable safety precautions when working around fuel. Whenever servicing the fuel system, always work in a well-ventilated area. Do not allow fuel spray or vapors to come in contact with a spark, open flame, or excessive heat (a hot drop light, for example). Keep a dry chemical fire extinguisher near the work area. Always keep fuel in a container specifically designed for fuel storage; also, always properly seal fuel containers to avoid the possibility of fire or explosion. Refer to the additional fuel system precautions later in this section.
- Fuel injection systems often remain pressurized, even after the engine has been turned **OFF**. The fuel system pressure must be relieved before disconnecting any fuel lines. Failure to do so may result in fire and/or personal injury.
- Brake fluid often contains polyglycol ethers and polyglycols. Avoid contact with the eyes and wash your hands thoroughly after handling brake fluid. If you do get brake fluid in your eyes, flush your eyes with clean, running water for 15 minutes. If eye irritation persists, or if you have taken

brake fluid internally, IMMEDIATELY seek medical assistance.

- The EPA warns that prolonged contact with used engine oil may cause a number of skin disorders, including cancer. You should make every effort to minimize your exposure to used engine oil. Protective gloves should be worn when changing oil. Wash your hands and any other exposed skin areas as soon as possible after exposure to used engine oil. Soap and water, or waterless hand cleaner should be used.
- All new vehicles are now equipped with an air bag system, often referred to as a Supplemental Restra nt System (SRS) or Supplemental Inflatable Restraint (SIR) system. The system must be disabled before performing service on or around system components, steering column, instrument panel components, wiring and sensors. Failure to follow safety and disabling procedures could result in accidental air bag deployment, possible personal injury and unnecessary system repairs.
- Always wear safety goggles when working with, or around, the air bag system. When carrying a non-deployed air bag, be sure the bag and trim cover are pointed away from your body. When placing a non-deployed air bag on a work surface, always face the bag and trim cover upward, away from the surface. The swill reduce the motion of the module if it is accidentally deployed. Refer to the additional air bag system precautions are around the air bag after in this section.
- Clean, high quality brake fluid from a sealed container is essential to the safe and

proper operation of the brake system. You should always buy the correct type of brake fluid for your vehicle. If the brake fluid becomes contaminated, completely flush the system with new fluid. Never reuse any brake fluid. Any brake fluid that is removed from the system should be discarded. Also, do not allow any brake fluid to come in contact with a painted surface; it will damage the paint.

- Never operate the engine without the proper amount and type of engine oil; doing so WILL result in severe engine damage.
- Timing belt maintenance is extremely important. Many models utilize an interference-type, non-freewheeling engine. If the timing belt breaks, the valves in the cylinder head may strike the pistons, causing potentially serious (also time-consuming and expensive) engine damage. Refer to the maintenance interval charts for the recommended replacement interval for the timing belt, and to the timing belt section for belt replacement and inspection.
- Disconnecting the negative battery cable on some vehicles may interfere with the functions of the on-board computer system(s) and may require the computer to undergo a relearning process once the negative battery cable is reconnected.
- When servicing drum brakes, only disassemble and assemble one side at a time, leaving the remaining side intact for reference.
- Only an MVAC-trained, EPA-certified automotive technician should service the air conditioning system or its components.

BRAKES

GENERAL INFORMATION

PRECAUTIONS

- Certain components within the ABS system are not intended to be serviced or repaired individually.
- Do not use rubber hoses or other parts not specifically specified for and ABS system. When using repair kits, replace all parts included in the kit. Partial or incorrect repair may lead to functional problems and require the replacement of components.
- Lubricate rubber parts with clean, fresh brake fluid to ease assembly. Do not

use shop air to clean parts; damage to rub-

- ber components may result.

 Use only DOT 3 brake fluid from an unopened container.
- If any hydraulic component or line is removed or replaced, it may be necessary to bleed the entire system.
- A clean repair area is essential. Always clean the reservoir and cap thoroughly before removing the cap. The slightest amount of dirt in the fluid may plug an orifice and impair the system function. Perform repairs after components have been thoroughly cleaned; use only denatured alcohol

ANTI-LOCK BRAKE SYSTEM (ABS)

- to clean components. Do not allow ABS components to come into contact with any substance containing mineral oil; this includes used shop rags.
- The Anti-Lock control unit is a microprocessor similar to other computer units in the vehicle. Ensure that the ignition switch is **OFF** before removing or installing controller harnesses. Avoid static electricity discharge at or near the controller.
- If any arc welding is to be done on the vehicle, the control unit should be unplugged before welding operations begin.

BRAKES

BLEEDING PROCEDURE

BLEEDING PROCEDURE

With ABS/ASC+T

- 1. Before servicing the vehicle, refer to the Precautions Section.
- 2. Connect pressurized brake bleeder to the reservoir

** CAUTION

Charging pressure should not exceed 2 bar (29 psi.)

Rear Brake Circuit

- 1. Connect bleeder hose and collecting container to the right rear brake.
- 2. Open the bleeder valve and flush until clear brake fluid emerges with no air bubbles.
 - 3. Close the bleed valve.
 - 4. Repeat for the left rear brake.

Front Brake Circuit

- 1. Connect bleeder hose and collecting container to the right front brake.
 - 2. Open the bleeder valve.
 - 3. Fully depress brake pedal at least 12

BLEEDING THE BRAKE SYSTEM

times until brake fluid emerges clear and without air bubbles.

- 4. Hold the brake pedal down.
- 5. Close the bleeder valve
- 6. Repeat for the left front brake.
- 7. Remove the pressurized brake bleeder.
- 8. Test for proper brake operation.

With DSC

- → This procedure requires the use of a factory or equivalent scan tool. Refer to scan tool documentation.
- 1. Before servicing the vehicle, refer to the precautions in the beginning of this section.
- 2. Connect the scan tool and set for service function 'Bleeding ABS/DSC Hydraulics'.
- 3. Connect pressurized brake bleeder to the reservoir.

** CAUTION

Charging pressure should not exceed 2 bar (29 psi.)

Flushing The Brake System

1. Connect bleeder hose and collecting container to the right rear brake.

- Open the bleeder valve and flush until clear brake fluid emerges with no air bubbles.
 - 3. Close the bleed valve.
- 4. Repeat for the left rear, right front, and left front brakes.

Bleeding The Rear Brake Circuit

- 1. Connect bleeder hose and collecting container to the right rear brake.
 - 2. Open the bleeder valve.
 - 3. Run the scan tool bleeding routine.
- 4. Press the brake pedal 5 times. Clear and bubble-free fluid must flow out.
 - 5. Close the bleed valve.
 - 6. Repeat for left rear brake.

Bleeding The Front Brake Circuit

- 1. Connect bleeder hose and collecting container to the right front brake.
 - 2. Open the bleeder valve.
 - 3. Run the scan tool bleeding routine.
- 4. Press the brake pedal 5 times. Clear and bubble-free fluid must flow out.
 - 5. Close the bleed valve.
 - 6. Repeat for left front brake.
- 7. Remove the pressurized brake bleeder.
 - 8. Test for proper brake operation.

BRAKES

** CAUTION

Dust and dirt accumulating on brake parts during normal use may contain asbestos fibers from production or aftermarket brake linings. Breathing excessive concentrations of asbestos fibers can cause serious bodily harm. Exercise care when servicing brake parts. Do not sand or grind brake lining unless equipment used is designed to contain the dust residue. Do not clean brake parts with compressed air or by dry brushing. Cleaning should be done by dampening the brake components with a fine mist of water, then wiping the brake components clean with a dampened cloth. Dispose of cloth and all residue containing asbestos fibers in an impermeable container with the appropriate label. Follow practices prescribed by the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) for the handling, processing, and disposing of

dust or debris that may contain asbestos fibers.

BRAKE CALIPER

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Apply the brake pedal slightly with a brake clamp.
 - 3. Remove or disconnect the following:
 - · Wheel assembly
 - Brake hose from caliper
 - Retaining spring across caliper
 - Plastic plugs over guide pin bolts
 - Guide pin bolts
 - Caliper from rotor

To install:

- 4. Position the caliper into place.
- 5. Clean but do not grease guide pin bolts
- 6. Install the torque the guide pin bolts to 23 ft. lbs. (31 Nm).
- 7. Replace the plastic plugs over the guide pin bolts.
 - 8. Install the retainer spring

FRONT DISC BRAKES

- 9. Install the brake pipe and banjo bolt to the caliper; torque to 30 ft. lbs. (40 Nm).
 - 10. Remove the brake clamp.
 - 11. Install the front wheels.
 - 12. Bleed the brakes.

DISC BRAKE PADS

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove the front wheels.
- 3. Remove the disc pad retaining spring from the caliper, from bottom and then from the top.
- 4. Remove the plastic plugs over the caliper guide pin bolts.
- 5. Remove the guide pin bolts and the calipers from the rotor.
 - 6. Press the piston back into caliper.

** CAUTION

Watch the brake fluid level in reservoir during this procedure.

7. Remove the outer brake pad (inner pad is held in place with a spring in the piston).

To install:

- 8. Check piston dust sleeves for damage: replace if needed.
 - 9. Clean all mating surfaces.
- 10. Apply anti-squeak compound to all mounting surfaces.
- 11. Install calipers; torque bolts to 21 ft. lbs. (31 Nm). Install the plastic plugs
- 12. Reposition retaining spring at the top, then at the bottom.
 - 13 Install front wheels.

- 14 Fully depress brake pedal several times to set proper contact of pads with rotor.
- 15. Check fluid level and bleed brake system, if necessary.

BRAKES

** CAUTION

Dust and dirt accumulating on brake parts during normal use may contain asbestos fibers from production or aftermarket brake linings. Breathing excessive concentrations of asbestos fibers can cause serious bodily harm. Exercise care when servicing brake parts. Do not sand or grind brake lining unless equipment used is designed to contain the dust residue. Do not clean brake parts with compressed air or by dry brushing. Cleaning should be done by dampening the brake components with a fine mist of water, then wiping the brake components clean with a dampened cloth. Dispose of cloth and all residue containing asbestos fibers in an impermeable container with the appropriate label. Follow practices prescribed by the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) for the handling, processing, and disposing of dust or debris that may contain asbestos fibers.

BRAKE CALIPER

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Apply the brake pedal slightly with a brake clamp.
 - 3. Remove or disconnect the following:
 - Wheel assembly
 - Retaining spring from bottom, then top, if applicable
 - Plastic plugs from guide pin bolts
 - Handbrake cable from handbrake lever and at rear caliper
 - Brake hose from caliper
 - Caliper guide bolts
 - · Rear caliper; remove toward rear

To install:

- 4. Position the caliper into place.
- 5. Install the torque the guide bolts to 21 ft. lbs. (28 Nm).
 - 6. Attach brake hose to caliper at torque

- banjo bolt, with new seals, to 33 ft. lbs. (45 Nm)
- 7. Install the handbrake cable to caliper and to handbrake.
- 8. Install the plastic plugs over the guide pin bolts.
- 9. Install the retaining spring at the top, then at the bottom, if applicable.
 - 10. Remove the brake clamp.
 - 11. Install the rear wheels.
 - 12. Adjust the parking brake.
 - 13. Bleed the brakes.

DISC BRAKE PADS

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

See Figure 1.

- 1. Before servicing the vehicle, refer to the precautions section.
- Remove the rear wheels.
 Remove the retaining spring from the top and then from the bottom, if applicable.
- 4. Remove the plastic plugs from the
- inside of the caliper.

 5. Remove the caliper guide pin bolts and remove the caliner from the rotor.
- 6. Use special tools, 34 6 301, 34 6 306/7/8, force piston back into caliper, as shown.
 - 7. Remove the disc pads.

To install:

8. Check condition of dust sleeve on piston; replace if needed.

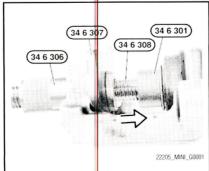


Fig. 1 Push piston into caliper for removal of disc pads

REAR DISC BRAKES

- 9. Clean all contact surfaces.
- 10. Apply anti-squeak compound to all mounting surfaces.
- 11. Install the new disc pads evenly in their mounted positions.
- 12. Clean caliper guide pin bolts; do not apply grease.
- 13. Install calipers and guide pin bolts. Torque bolts to 21 ft. lbs. (28 Nm).
 - 14. Install the plastic plugs.
- 15. Install the retaining spring at the bottom and then at the top, if applicable.
 - 16. Install rear wheels.
- 17. Fully depress brake pedal several times to set proper contact of pads with rotor.
 - 18. Bleed brake system, if necessary.

2007-08 Cooper and Cooper S

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove the rear wheels.
- 3. Pull brake pad wear sensor towards front out of pad (left side only).
 - 4. Release guide screw.
 - 5. If necessary, grip at hexagon head.
 - 6. Feed brake hose out of holder.
 - 7. Tilt brake caliper upwards.
- 8. Remove brake pads in direction of arrow from brake console.

→ Mark any worn brake pads. In the event of one-sided brake pad wear, do not change brake pads round.

- 9. Observe minimum thickness of brake pads.
 - 10. Clean brake pads.

→ Do not apply grease to brake pad backplate.

- 11. Check minimum brake disc thickness: Position special tool No. 34 1 280 at three measuring points in area and measure. Compare measurement result and lowest value with setpoint value. New brake pads may only be installed if the brake disc thickness is greater than or equal to the minimum brake disc thickness.
- →The minimum thickness of the brake disc is designed so that it holds over the service life of a further set of brake

pads if it is greater than or equal to the minimum brake disc thickness.

12. Remove pad retaining springs.

To install:

- 13. Press brake piston fully back with special tool No. 34 1 050.
- 14. Check dust sleeve for damage and replace if necessary.
- 15. Clean contact face of brake piston and apply a thin coating of antisqueak compound. Dust sleeve must not come into contact with anti-squeak com-

pound as this may cause the dust sleeve to swell.

- 16. Clean contact face of brake caliper and apply a thin coating of anti-squeak compound.
- 17. Clean hammerhead guides and apply a thin coating of anti-squeak compound.
- 18. Install pad retaining springs. Clean contact face of brake carrier and apply a thin coating of anti-squeak compound.
- ⇒Brake pad with indentation is intended for accommodating the brake pad wear sensor and must be fitted on the piston side.
- 19. The remainder of installation is the reverse of removal, noting the following:
 - Fully depress brake pedal several times so that brake pads contact brake discs
 - When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking
 - If necessary, when replacing pads, reset CBS display in accordance with factory specification

CHASSIS ELECTRICAL

AIR BAG (SUPPLEMENTAL RESTRAINT SYSTEM)

GENERAL INFORMATION

** CAUTION

These vehicles are equipped with an air bag system. The system must be disarmed before performing service on, or around, system components, the steering column, instrument panel components, wiring and sensors. Failure to follow the safety precautions and the disarming procedure could result in accidental air bag deployment, possible injury and unnecessary system repairs.

SERVICE PRECAUTIONS

Disconnect and isolate the battery negative cable before beginning any airbag system component diagnosis, testing, removal, or installation procedures. Allow system capacitor to discharge for two minutes before beginning any component service. This will disable the airbag system. Failure to disable the airbag system may result in accidental airbag deployment, personal injury, or death.

Do not place an intact undeployed airbag face down on a solid surface. The airbag will propel into the air if accidentally deployed and may result in personal injury or death.

When carrying or handling an undeployed airbag, the trim side (face) of the airbag should be pointing towards the body to minimize possibility of injury if accidental deployment occurs. Failure to do this may result in personal injury or death.

Replace airbag system components with OEM replacement parts. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection. Failure to do so may result in occupant personal injury or death.

Wear safety glasses, rubber gloves, and long sleeved clothing when cleaning powder residue from vehicle after an airbag deployment. Powder residue emitted from a deployed airbag can cause skin irritation. Flush affected area with cool water if irritation is experienced. If nasal or throat irritation is experienced, exit the vehicle for fresh air until the irritation ceases. If irritation continues, see a physician.

Do not use a replacement airbag that is not in the original packaging. This may result in improper deployment, personal injury, or death.

The factory installed fasteners, screws and bolts used to fasten airbag components have a special coating and are specifically designed for the airbag system. Do not use substitute fasteners. Use only original equipment fasteners listed in the parts catalog when fastener replacement is required.

During, and following, any child restraint anchor service, due to impact event or vehicle repair, carefully inspect all mounting hardware, tether straps, and anchors for proper installation, operation, or damage. If a child restraint anchor is found damaged in any way, the anchor must be replaced. Failure to do this may result in personal injury or death.

Deployed and non-deployed airbags may or may not have live pyrotechnic material within the airbag inflator.

Do not dispose of driver/passenger/curtain airbags or seat belt tensioners unless you are sure of complete deployment. Refer to the Hazardous Substance Control System for proper disposal.

Dispose of deployed airbags and tensioners consistent with state, provincial, local, and federal regulations.

After any airbag component testing or service, do not connect the battery negative cable. Personal injury or death may result if the system test is not performed first.

If the vehicle is equipped with the Occupant Classification System (OCS), do not connect the battery negative cable before performing the OCS Verification Test using the scan tool and the appropriate diagnostic information. Personal injury or death may result if the system test is not performed properly.

Never replace both the Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) at the same time. If both require replacement, replace one, then perform the Airbag System test before replacing the other.

Both the ORC and the OCM store Occupant Classification System (OCS) calibration data, which they transfer to one another when one of them is replaced. If both are replaced at the same time, an irreversible fault will be set in both modules and the OCS may malfunction and cause personal injury or death.

If equipped with OCS, the Seat Weight Sensor is a sensitive, calibrated unit and must be handled carefully. Do not drop or handle roughly. If dropped or damaged, replace with another sensor. Failure to do so may result in occupant injury or death.

If equipped with OCS, the front passenger seat must be handled carefully as well. When removing the seat, be careful when setting on floor not to drop. If dropped, the sensor may be inoperative, could result in occupant injury, or possibly death.

If equipped with OCS, when the passenger front seat is on the floor, no one should sit in the front passenger seat. This uneven force may damage the sensing ability of the seat weight sensors. If sat on and damaged, the sensor may be inoperative, could result in occupant injury, or possibly death.

DISARMING THE SYSTEM

1. Before servicing the vehicle, refer to the precautions section.

- 2. Place the ignition switch in the OFF position.
- 3. Disconnect the negative battery terminal and cover the battery terminal to prevent accidental contact.
- 4. Once the battery has been disconnected, wait for a short period of time to allow the capacitor in the control unit to discharge. Once the capacitor is discharged, a trigger pulse cannot be generated inadvertently.

ARMING THE SYSTEM

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Place the ignition switch in the **OFF** position.
- 3. Attach the sensors, the steering column connector and the seat belt tensioner connectors.
 - 4. Connect the negative battery terminal.
- 5. Place the ignition switch in the **ON** position. Check that the SRS light illuminates for 6 seconds and extinguishes. If it

illuminates in any other pattern, check the components and their connections for proper operation and recheck operation of the warning light.

CLOCKSPRING CENTERING

- 1. Turn spring counterclockwise as far as it will go.
 - 2. Turn spring clockwise as far as it will go.
- 3. Turn spring back to center position and secure so that centering pin is at bottom position.

DRIVETRAIN

AUTOMATIC TRANSAXLE ASSEMBLY

REMOVAL & INSTALLATION

See Figures 2 through 5.

1. Before servicing the vehicle, refer to the precautions section.

** WARNING

Use only the approved automatic transmission fluid in this automatic transmission. Failure to comply with this requirement will result in serious damage to the automatic transmission.

- →An incorrectly adjusted gearshift mechanism can result in gear teeth noises being transmitted to the passenger compartment. Adjust selector lever.
 - 2. Switch off ignition.
 - 3. Disconnect the negative battery cable.
 - 4. Remove air intake filter housing.
 - 5. Remove intake filter housing gaiter.
 - 6. Drain coolant.
- 7. Secure engine in installation position
 - 8. Lower front axle support.

- 9 Remove starter
- 10. Remove rubber mounts for transmission mounting.
 - 11. Remove left and right output shafts.
- 12. For N14 engines, release screws and release holder from engine.
 - 13. Unfasten hose clips.
- 14. Disconnect coolant hoses from oil cooler.
- 15. Disconnect multiple connectors (1/2) of EGS control unit.
 - 16. Remove wiring harness.
- 17. Pay attention to routing of wiring harness.
 - 18. Release cable lock nut.
- 19. Disconnect plug from gear position switch.
 - 20. Remove hose from holder.
- 21. Slide cable locking sleeve in direction of arrow.
 - 22. Remove cable upwards from holder.
- 23. Support transmission with special tools No. 23 4 150 and No. 00 2 030.
- 24. Secure transmission with tensioning strap.
- 25. Release nut through opening for starter.

- 26. Crank engine further and release remaining 5 nuts.
- 27. Release bolts and remove transmis-

** WARNING

Transmission mounting bolts differ in length. Note installation position. Installing the wrong bolts may cause serious damage.

- 28. Installation is the reverse of removal, noting the following torque specifications:
 - Cable lock nut: 9 ft. lbs. (12 Nm).



Fig. 4 Release nuts

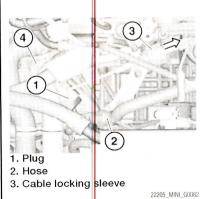






Fig. 5 Automatic transaxle bolts

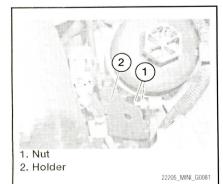


Fig. 2 Release screws and holder from engine-2007-08 Cooper S models

- Converter bolt: 42 ft. lbs. (57 Nm).
- Transmission to engine bolts: 28 ft. lbs. (38 Nm).
- 29. Check that dowel sleeves are correctly seated. Replace damaged dowel sleeves.
 - 30. Check transmission fluid level.

MANUAL TRANSAXLE ASSEMBLY

REMOVAL & INSTALLATION

Cooper Coupe

See Figures 6 through 8.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Remove or disconnect the following:
 - Negative battery cable
 - Battery and battery box
 - · Manifold heat shield
 - Engine stabilizer (upper)
 - Fuel and vent pipes from bracket near stabilizer
 - · Drain transaxle
 - · Front left wheel well liner
 - Driveshafts with steering knuckle carrier
 - · Lower stabilizer



Fig. 6 Installing engine lifting eye bracket—Cooper Coupe

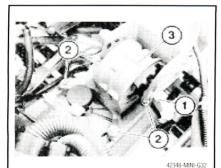


Fig. 7 Identifying the location of the transaxle mount—Cooper Coupe

- Front subframe
- Gearshift cables from ball joint attachment
- · Gearshift cable bracket
- Clutch slave cylinder from transaxle
- Reverse lamp connector from transaxle
- Brake booster pipe from manifold (push down circular ring to release)
- Coolant pressure cap from fill tower
- Oxygen sensor bracket, coolant hose clamp, and bolt
- 3. Install a engine lifting eye bracket, 11–8–260 as shown.
- 4. Support the engine with lifting equipment.
- 5. Raise equipment enough to take weight of engine and transaxle.
- 6. Remove the upper bracket retaining bolt (1), mount to transaxle bolts (2) and remove the transaxle mount.
- 7. Lower the engine about 1.5 inches (40mm).

** CAUTION

DO NOT lower engine too much or exhaust system could be damaged. Also watch A/C pipe to compressor when lowering engine.

- 8. Remove or disconnect the following:
 - · Starter heat shield
 - Oxygen sensor wiring from clip
 - Starter
 - Closure plate bracket around inner driveshaft opening
- 9. Support transaxle with suitable jack.
- 10. Remove the transaxle retaining bolts.
- 11. Remove the transaxle.

⇒Shorter 2 bolts are located into oil pan.

To install:

- 12. Clean all mating surfaces.
- 13. Position the transaxle into the vehicle.

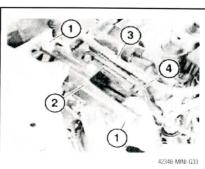


Fig. 8 Showing the upper stabilizer bracket and bolt locations, plus the location of the fuel and vent pipes—Cooper Coupe

14. Install and torque the transaxle—to—engine housing bolts to 63 ft. lbs. (85 Nm).

→2 shorter bolts go directly into oil pan.

- 15. Remove jack.
- 16. Install and torque closure plate bracket bolts to 7 ft. lbs. (9 Nm).
 - 17. Install or connect the following:
 - Starter; torque bolts to 63 ft. lbs. (85 Nm)
 - Starter heat shield; torque bolts to 7 ft. lbs. (9 Nm)
 - Starter electrical connections
 - Oxygen sensor to clip near starter heat shield
- 18. Raise the engine back into normal position and install the transaxle mount. Torque the bolts as follows:
 - Mount bracket—to<TRANSAXLE>: 28 ft. lbs. (38 Nm)
 - Mount-to-upper bracket: 49 ft. lbs. (66 Nm)
- 19. Slowly release engine tension from lift equipment. Remove the equipment.
- 20. Remove the engine lifting eye bracket.
 - 21. Install or connect the following:
 - · Coolant hose, clamp and bolt
 - Oxygen sensor bracket (near coolant hose)
 - Brake booster pipe to manifold
 - · Reverse light switch connector
 - Clutch slave cylinder; torque bolts to 18 ft. lbs. (24 Nm)
 - · Gearshift cable and bracket
 - Front subframe
 - Lower stabilizer bracket (2); torque bolts (1) to 74 ft. lbs. (100 Nm)
 - Driveshafts and steering knuckle carrier
 - Left wheel well liner
 - 22. Refill the transaxle with proper oil.
- 23. Install the upper stabilizer bolts. Torque the bolts to 74 ft. lbs. (100 Nm).
- 24. Attach the fuel and vent pipes to the upper stabilizer.
 - 25. Install the manifold heat shield.
 - 26. Install and connect the battery.
- 27. Start the engine and check transaxle operation.

Cooper S Coupe

See Figures 9 and 10.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove or disconnect the following:
 - Negative battery cable
 - Battery and battery box
 - Intake filter housing

- · Manifold heat shield
- Engine stabilizer (upper)
- Fuel and vent pipes from bracket near stabilizer
- Drain transaxle
- · Front left wheel well liner
- Driveshafts with steering knuckle carrier
- Lower stabilizer
- · Crush tubes
- · Front subframe
- · Coolant expansion tank cap
- Oxygen sensor bracket, coolant hose clamp, and bolt
- 3. Install an engine lifting eye bracket, 11–8–260 as shown.
- 4. Remove the gearshift cables from ball joint attachment, with special tool 23–4<010, then remove the gearshift cable mounting bracket.
- 5. Remove the clutch slave cylinder from the transaxle.
- 6. Disconnect the reverse light switch connector from the transaxle.
- 7. Open the hood to the full upright position and install strut extensions, 51–2–160, to hold the hood in this position.
- 8. Support the engine with lifting equipment.
- 9. Raise equipment enough to take weight of engine and transaxle.
 - 10. Remove or disconnect the following:
 - · Throttle housing
 - Supercharger intake hose
 - Detach other pipes by quick-fit couplings
 - Slave cylinder hose from transaxle and move aside
 - Closure plate around inner driveshaft opening
 - · Starter heat shield
 - Oxygen sensor from clip on heat shield
 - Starter connections and move wiring harness aside

- Starter
- Transaxle mount
- 11. Lower the engine about 5 inches (135 mm).
 - 12. Support transaxle with suitable jack.
 - 13. Remove the transaxle retaining bolts.
 - 14. Remove the transaxle.

- 15. Clean all mating surfaces.
- 16. Position the transaxle into the vehicle.
- 17. Install and to que the transaxle—to—engine housing bolts to 63 ft. lbs. (85 Nm).
 - 18. Remove jack.
 - 19. Raise the engine to normal position.
 - 20. Install or connect the following:
 - Transaxle mount; torque bolts to 49 ft. lbs. (66 Nm)
 - Starter; torque bolts to 63 ft. lbs. (85 Nm)
 - Starter electrical connections and wiring harness
 - Oxygen sensor to clip near starter heat shield
 - Starter heat shield; torque bolts to 7 ft. lbs. (9 Nm)
 - Closure plate bolts to 7 ft. lbs. (9 Nm).
- 21. Install the lower support bracket and torque the bolts as follows:
 - Mount bracket—to<TRANSAXLE>: 28 ft. lbs. (38 Nm)
 - Mount—to—upper bracket: 49 ft. lbs. (66 Nm)
 - 22. Install or connect the following:
 - MAP senso
 - Slave cylinder hose to transaxle
 - Supercharger, pipes and hoses
 - Supercharger, pipes and noses
 Reverse light switch connector
 - Slave cylinder to transaxle; torque bolts to 18 ft. lbs. (24 Nm)
 - Gearshift cables and bracket
- 23. Slowly release engine tension from lift equipment. Remove the equipment.

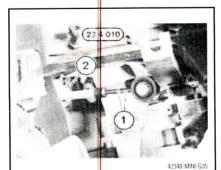


Fig. 10 Disconnect the gearshift cables from the ball joints—Cooper S Coupe

- 24. Remove the engine lifting eye bracket
- 25. Install or connect the following:
 - · Coolant hose, clamp and bolt
 - Oxygen sensor bracket (near coolant hose)
- 26. Install the front subframe; torque bolts to 74 ft. lbs. (100 Nm)
- 27. Reinstall the MFE to its normal position. Torque the bolts as follows:
 - M8x30 bolts: 17 ft. lbs. (22 Nm)
 - M6x16 bolts: 3 ft. lbs. (5 Nm)
 - 28. Install or connect the following:
 - Crush member–to–subframe: 74 ft. lbs. (100 Nm)
 - Lower stabilizer bracket (2); torque bolts (1) to 74 ft. lbs. (100 Nm)
 - Driveshafts and steering knuckle carrier
 - · Left wheel well liner
 - 29. Refill the transaxle with proper oil.
- 30. Install the upper stabilizer bolts. Torque the bolts to 74 ft. lbs. (100 Nm).
- 31. Attach the fuel and vent pipes to the upper stabilizer.
 - 32. Install the manifold heat shield.
 - 33. Install and connect the battery.
- 34. Start the engine and check transaxle operation.

CLUTCH

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove or disconnect the following:
 - 3. Remove the transmission.
- 4. Using a holding tool to restrain or lock the crankshaft pulley in place (keep it from turning).
- 5. Slacken the pressure plate bolts evenly, in an alternating sequence, then remove all bolts.
 - 6. Remove the pressure plate and disc.

- 7. Position the clutch disc onto the transmission input shaft and check for free movement.
- 8. Install the pressure plate and clutch disc onto the flywheel, using a special tool, 21–6–100 (Cooper Coupe) or 21–2–210 (Cooper S Coupe).
- 9. Install new pressure plate retaining bolts. Tighten them gradually and evenly, in an alternating pattern. Final torque setting is 15 ft. lbs. (20 Nm) for Cooper Coupe or to 17 ft. lbs. (23 Nm) for Cooper S Coupe.
- → During the tightening process, rotate the special holding tool. This will help to centralize the clutch disc.



Fig. 9 Installing engine lifting eye bracket—Cooper S Coupe

- 10. Remove the special tool from the clutch.
 - 11. Install the transmission.
- 12. Remove the holding tool from the crankshaft pulley.

BLEEDING

- 1. Before servicing the vehicle, refer to the precautions in the beginning of this section.
 - 2. Remove the battery compartment.
- 3. Remove the dust cap from the bleeder screw.
- 4. Attach Special Service Tool 21 5 030 to the clutch slave cylinder.
 - 5. Open the bleed screw.

→Operating pressure must not exceed 1 bar (14.5 psi.). Refer to equipment operating instructions.

- 6. Close bleed screw when no further bubbles appear.
 - 7. Fill the brake fluid to the correct level.

FRONT HALFSHAFT

REMOVAL & INSTALLATION

See Figures 11 and 12.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove or disconnect the following:
 - · Front wheel
 - · Front wheel hub nut
 - · Drain transaxle
 - Brake caliper from disc (tie out of way; hose connected)
 - Tie rod ball joint from steering knuckle
 - ABS sensor from steering knuckle
 - · Control arm from steering knuckle
- On right side driveshaft only, remove bolts holding the intermediate shaft housing to the bracket.
- 4. Pull the driveshaft from transaxle (discard snap ring)
- 5. Remove the bolt holding the steering knuckle to the McPherson strut, then lift the steering knuckle out with the driveshaft.

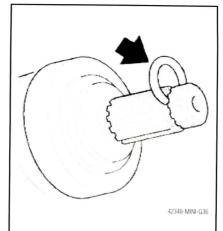
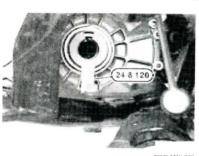


Fig. 11 Installing a new snap ring on driveshaft inner spline



42348-MINI-G3

Fig. 12 Showing special seal protector tool installed in transaxle

To install:

- 6. Install a new snap ring on the end of the driveshaft inner spline.
- 7. Install a special seal protector tool, 24–8–120, into side of transaxle.
- 8. Position the driveshaft to the transaxle and insert into to seal. Pull on the special tool handle to remove once the driveshaft is in position.
- Push in output shaft over the resistance of the retaining ring until it snaps in place.

- 10. Install the steering knuckle to the McPherson strut. Torque the retaining bolt to 60 ft. lbs. (81 Nm).
- 11. Install the intermediate shaft housing to the bracket. Torque the retaining bolts to 18 ft. lbs. (25 Nm).
 - 12. Install or connect the following:
 - Control arm to steering knuckle; torque new nut to 41 ft. lbs. (56 Nm)
 - ABS sensor to steering knuckle; torque to 6 ft. lbs. (8 Nm)
 - Tie rod to steering knuckle; torque new ball joint nut to 38 ft. lbs. (52 Nm)
 - Brake caliper to disc; torque caliper guide bolts to 23 ft. lbs. (31 Nm)
 - Front wheel hub nut; torque new nut to 134 ft. lbs. (182 Nm)
 - Front wheel
 - 13. Refill the transaxle.

CV-JOINTS OVERHAUL

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove the driveshaft.
 - 3. Remove the bellows clamps.
- 4. Slide the bellows away from the inner CV joint.
- 5. Hold the shaft firmly and drive the inner CV joint off the shaft.
 - 6. Remove the bellows.

- 7. Install a new bellows and seal onto the shaft.
- 8. Generously pack new joint with grease. Be sure the joint rests on the new snap ring on the shaft.
- Press the snap ring into the shaft groove, then drive the CV joint onto the shaft.
- 10. Slide the bellows onto the joint and shaft and make sure the seal bearing of the bellows fits into the grooves on the shaft on one end and the grooves on the CV joint on the other end.
 - 11. Install the bellows clamps.
 - 12. Install the driveshaft.

ENGINE COOLING

THERMOSTAT

REMOVAL & INSTALLATION

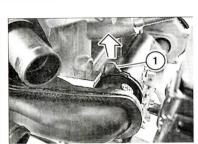
2007-08 Cooper and Cooper S

See Figure 13.

- Drain coolant.
- 2. For N14 engine, remove the intake air manifold.
- 3. Release lock on coolant pipe in direction of arrow.
- 4. Disconnect the thermostat plug connection.
- 5. Using Special Tool No. 17 2 050, detach all coolant hoses from thermostat.
- 6. Disconnect the coolant temperature sensor plug connection.
 - 7. Loosen the nut and remove the screws.
 - 8. Remove the seal.

To install:

9. Installation is the reverse of removal.



1. Coolant pipe lock

22205_MINI_G0002

Fig. 13 Release lock on coolant pipe

WATER PUMP

REMOVAL & INSTALLATION

2006 Cooper Coupe

See Figure 14.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Disconnect the battery.
 - 3. Drain the cooling system.
- 4. Remove the alternator drive belt and alternator.
- 5. Drain the cooling system. Drain plug is located on exhaust side of block, next to cylinder number 2.
- 6. Remove the lower modular front end (MFE) as follows:
 - a. Discharge the A/C system.
 - b. Remove the engine compartment under tray.

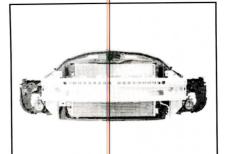


Fig. 14 Showing the modular front end (MFE) assembly—Cooper Coupe

- c. Remove the front bumper assembly.
- d. Remove both front wheel well liners.
- e. Remove or disconnect the following:
- Cooling fan connectors
- A/C pipe from condenser (plug openings)
- A/C pipe from A/C hose (plug openings)
- ABS speed sensor connector from clip (both sides)
- Front fog lamp connector (both sides)
- Horn connector (both sides)
- Feed harness through MFE into wheel housing (both sides)
- Subframe crash tube bolts (both sides)
- Upper radiator hose
- Nuts securing MFE and bumper carrier assembly
- MFE
- 7. Insert bracing tools, 11–8–401/2, to provide access room.
 - 8. Detach the hoses from the water pump.
- 9. Remove the tolts and remove the water pump.

To install:

- 10. Install or connect the following:
 - Water pump mounting bolts; torque to (30 Nm)
 - Hoses to water pump
 - Impact tubes; torque bolts to 74 ft. lbs. (100 Nm)
 - MFE
 - Alternator
 - Battery
- 11. Refill the cooling system. Start the engine and check for leaks.

2006 Cooper S Coupe

See Figures 15 and 16.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain the cooling system.

- 3. Remove the negative battery cable.
- 4. Remove the supercharger
- 5. Remove the water pump bolts.
- 6. Remove the water pump.

To install:

- 7. Clean and remove any residual debris or material from the mounting surfaces for the water pump.
- 8. Align the water pump drive with the supercharger drive.
- 9. Install the water pump to the super-charger. Torque the bolts to 18 ft. lbs. (25 Nm).
- 10. Install a new sealing ring to the water pump and lubricate the seal.
 - 11. Install the supercharger.
 - 12. Reconnect the negative battery cable.
 - 13. Fill and bleed the cooling system.
- 14. Start the vehicle, check for leaks and repair as necessary.

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- 1. Remove drive belt tensioner.
- 2. Remove screws.
- 3. Remove seal.

- 4. Clean sealing surfaces.
- 5. Installation is the reverse of removal.

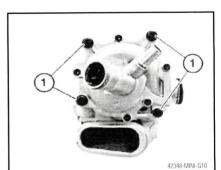


Fig. 15 Showing the location of the water pump mounting bolts—Cooper S Coupe

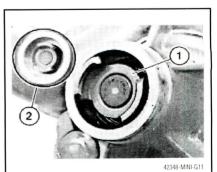


Fig. 16 Aligning water pump drive (1) to supercharger drive (2)—Cooper S Coupe

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ENGINE ELECTRICAL

ALTERNATOR

REMOVAL & INSTALLATION

→When the battery is disconnected the radio code, on-board computer and clock settings will be lost. The radio code should be obtained before disconnecting the battery or radio. Once the battery has been reconnected, the radio will not function unless the code is keyed in.

2006 Cooper Coupe

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Check for stored fault codes, then erase code memory.
 - 3. Switch off ignition.
 - 4. Disconnect negative battery cable.
 - 5. Remove or disconnect the following:
 - · Alternator drive belt
 - Electrical connections from alternator
 - · Alternator mounting bolts
 - Alternator

To install:

6. To install, reverse removal procedure.

7. Torque alternator mounting bolts to 18 ft. lbs. (25 Nm) and the power lead to the alternator stud to 7 ft. lbs. (10 Nm).

- 8. Check for any stored fault codes.
- 9. Clear fault code memory.

2006 Cooper S Coupe

See Figure 17.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Check for stored fault codes, then erase fault code memory.
 - 3. Switch off ignition.

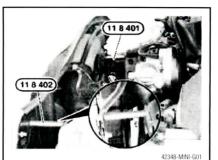


Fig. 17 Installing special tools to move modular front end for alternator access—Cooper S Coupe models

- 4. Disconnect the battery.
- 5. Remove or disconnect the following:
 - · Alternator drive belt
- Front bumper cover
- 6. Loosen the retainers for the modular front end and insert bracing tools,
- 11–8–401/2, to provide access room.
 7. Detach the electrical connections
- from the alternator.

 8. Remove the mounting bolts and remove the alternator.

To install:

- 9. To install, reverse removal procedure.
- 10. Torque alternator mounting bolts to 18 ft. lbs. (25 Nm) and the power lead to the alternator stud to 7 ft. lbs. (10 Nm).
 - 11. Check for any stored fault codes.
 - 12. Clear fault code memory.

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See Figure 18.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Check for stored fault codes, then erase fault code memory.
 - 3. Switch off ignition.

CHARGING SYSTEM

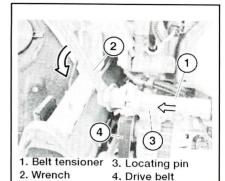


Fig. 18 Drive belt removal

- 4. Disconnect the battery.
- 5. Move the front panel into assembly position.
- For N14 engines, remove the bolt, then remove the bracket and place to one side.
- 7. Bring belt tensioner with wrench into assembly position and hold.
- 8. Secure assembly position of belt tensioner by sliding locating pin in direction of arrow.

** CAUTION

Remove wrench again from belt tensioner.

- 9. Unlock connector and remove.
- 10. Release nut and remove battery positive lead.
- 11. Release screws and remove the belt tensioner.
 - 12. Release screw with joint extension.
 - 13. Remove alternator.

To install:

14. Installation is the reverse of removal.

ENGINE ELECTRICAL

FIRING ORDER

The firing order for these engines is: 1-3-4-2

IGNITION COIL

REMOVAL & INSTALLATION

2006 Cooper and Cooper S

See Figure 19.

1. Before servicing the vehicle, refer to

the precautions in the beginning of this section.

- 2. Disconnect the negative battery cable.
- 3. Disconnect the ignition coil wiring harness.
 - 4. Remove the spark plug wires.
- 5. Remove the three screws and the ignition coil.

To install:

- 6. Install the ignition coil and tighten the three screws to 12 Nm (106 inch lbs.).
 - 7. Install the spark plug wires.

IGNITION SYSTEM

8. Connect the ignition coil wiring harness.

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- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Check for stored fault codes.
 - 3. Turn ignition off.
 - 4. Remove upper engine cover.
- 5. Unlock the plug retainer of ignition coil and disconnect the plug.
 - 6. Pull the ignition coil up and out.

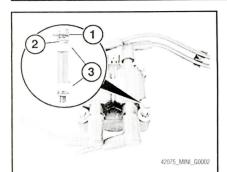


Fig. 19 Screw (1) and spacer tube (2) are only available as a single set Check insulating rings (3), replace if necessary

7. Installation is the reverse of removal.

IGNITION TIMING

ADJUSTMENT

The ignition timing is controlled by the Powertrain Control Module (PCM). No adjustment is necessary or possible.

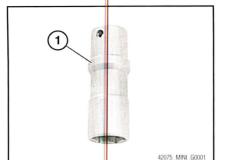


Fig. 20 Special Service Tool 12 1 170— (1) This collar must be ground off for proper fit

SPARK PLUGS

REMOVAL & INSTALLATION

2006 Cooper and Cooper S

See Figure 20.

- 1. Remove the spark plug wire connectors.
- 2. Using Special Service Tool 12 1 170, remove the spark plugs.

3. Clean the spark plugs.

4. If the electrode has traces of wet carbon, allow it to dry and then clean with a spark plug cleaner.

5. Check the spark plug for thread damage and insulator damage. If abnormal, replace the spark plug.

6. Using Special Service Tool 12 1 170, install the spark plugs and tighten to 27 Nm (20 ft. lbs.)

7. Reinstall the ignition coils.

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- 1. Turn ignition off.
- 2. Remove the ignition coils.
- 3. Unscrew and remove spark plugs with Special Tool 12 1 220.

To install:

4. Tighten spark plugs, using Special Tool 12 1 220 and Special Tool 12 1 172. If special tool 12 1 172 is not used, torque to 17 ft. lbs. (23 Nm).

ENGINE ELECTRICAL

STARTER

REMOVAL & INSTALLATION

2006 Cooper and Cooper S

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove or disconnect the following:
 - Battery
 - · Exhaust system from manifold
 - Exhaust manifold
 - · Heat shield from starter
 - Oxygen sensor cable from wire clip
 - Alternator connectors
 - Starter solenoid connectors
 - Starter

To install:

- 3. Install or connect the following:
 - Starter to transmission; torque mounting bolts to 63 ft. lbs. (85 Nm)
 - Alternator connector on starter; torque to 10 ft. lbs. (14 Nm)
 - Oxygen sensor cable to wire clip
 - Heat shield for starter; torque bolts to 7 ft. lbs. (9 Nm)
 - Exhaust manifold
 - · Exhaust pipes to manifold
 - Battery

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See Figures 21 and 22.

- 1. Turn ignition off.
- 2. Disconnect the negative battery cable.
 - 3. Remove intake filter housing.
- 4. For N12 engine, remove the tank venting valve.
 - 5. Remove the right wheel.
- 6. For N14 engine, remove the bolts and lay the vacuum tank to one side.

STARTING SYSTEM

- 7. Release screw.
- 8. Unlock plug and remove.
- 9. Release nut and remove battery positive lead.
 - 10. Release screws.
 - 11. Remove bracket and starter motor.

- 12. Install starter and fit screws.
- 13. Press starter in direction of arrow and tighten down.
- 14. The remainder of installation is the reverse of removal.

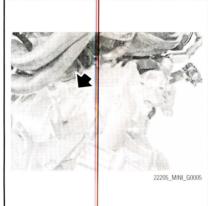


Fig. 21 Remove starter screw

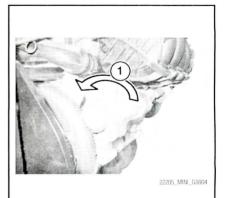


Fig. 22 Install starter

ENGINE MECHANICAL

→ Disconnecting the negative battery cable may interfere with the functions of the on board computer systems and may require the computer to undergo a relearning process, once the negative battery cable is reconnected.

ACCESSORY DRIVE BELTS

ACCESSORY BELT ROUTING

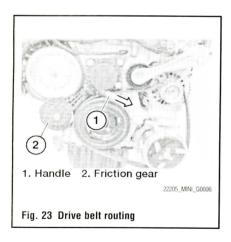
See Figure 23.

INSPECTION

Inspect the drive belt for signs of glazing or cracking. A glazed belt will be perfectly smooth from slippage, while a good belt will have a slight texture of fabric visible. Cracks will usually start at the inner edge of the belt and run outward. All worn or damaged drive belts should be replaced immediately.

ADJUSTMENT

No adjustment is possible.



REMOVAL & INSTALLATION

2006 Cooper and Cooper S

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Disconnect the negative battery cable.
 - 3. Remove the engine undercover.
 - 4. Remove the right front wheel.
 - 5. Remove the right front inner fender.
- 6. Using Special Service Tools 11 8 410, relieve the tension on the drive belt. Block the tensioner with Special Service Tool 11 8 470.
 - 7. Remove the accessory drive belt.
- 8. Installation is the reverse of the removal procedure.

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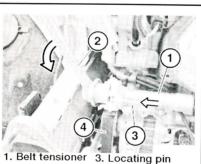
See Figures 24 and 25.

- 1. Remove right wheel arch cover.
- 2. Remove right headlight.
- 3. Remove lock bridge.
- 4. Bring belt tensioner with wrench into assembly position.
- 5. Secure assembly position of belt tensioner by sliding locating pin in direction of arrow.

** CAUTION

Remove wrench again from belt tensioner.

- 6. Remove drive belt from alternator.
- 7. Move friction wheel into servicing position.
- 8. In order to release the frictional connection between crankshaft and coolant pump, it is necessary to move the friction gear into the servicing position.
- 9. Firmly pull the handle in direction of arrow until friction gear is separated from belt pulley.
- 10. To secure friction gear in servicing position, suspend pull cable on housing.



Belt tensioner 3. Locating pii
 Wrench 4. Drive belt

22205 MINI G0003

Fig. 24 Drive belt removal

To install:

11. Installation is the reverse of the removal procedure.

CAMSHAFT AND VALVE LIFTERS

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

See Figure 26.

- 1. Before servicing the vehicle, refer to the precautions section.
 - a. Remove or disconnect the following:
 - Battery
 - Spark plugs
 - Wheel well liners
 - Cylinder head cover
 - Left engine mount
 - Hydraulic chain tensioner
- 2. Remove bolts from rocker arm shafts in sequence shown.
- 3. Install a special engine holding tool, 11–8–370, onto cylinder block and fixture of engine mount.
- 4. Remove the camshaft (CMP) sensor connector and then the sensor.
- 5. Rotate the engine until the triangular adjustment mark on the camshaft gear is at the 12 o'clock position. Apply a paint mark across the adjustment mark and timing chain for reassembly reference. Also mark the vibration damper and timing case cover with a paint reference mark.

→Brass color timing chain links are of no importance to chain timing.

6. Install a special locking tool, 11–8–250, onto camshaft gear and loosen, but do not remove, the camshaft gear center bolt. Remove the special tool.

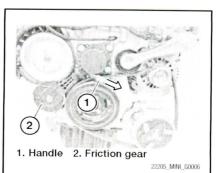


Fig. 25 Separate friction gear from belt pulley

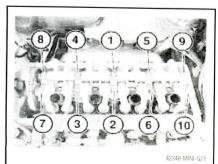


Fig. 26 Showing rocker arm shaft bolt removal and tightening sequence—Cooper Coupe

- 7. Make sure that paint reference mark on camshaft gear and timing chain are aligned, then remove the camshaft gear cen-
- 8. Remove all the camshaft bearing cans and the camshaft. Be sure to keep bearing caps in same order and orientation as removed.

- 9. Check components for signs of wear or damage. Replace components as necessary.
- →If camshaft is replaced with a new unit, rocker arms must also be replaced.

** CAUTION

Install bearing caps in same positions as removed.

- 10. Lubricate camshaft bearing journals and rocker arm rolling areas with clean engine oil
- 11. Install timing chain to the camshaft gear.
- 12. Ensure that the timing reference paint marks are aligned.
- 13. Install the camshaft gear center bolt.
- 14. Install the camshaft gear locking tool. 11-8-250, then torque the center bolt to 75 ft. lbs. (102 Nm). Remove the locking tool.
- 15. Apply a thin coat of engine oil to the camshaft seal.
- 16. Remove the engine holding tool, 11-8-370
 - 17. Install or connect the following:
 - · CMP sensor and connector
 - Rocker arm shafts; torque bolts first evenly by hand, then to 22 ft. lbs. (30 Nm) in sequence shown.
 - Hydraulic chain tensioner
- 18. Install the left engine (hydra) mount. Torque the bolts as follows:
 - M10x110 bolts: 41 ft. lbs. (56 Nm), then an additional 90 degrees
 - Other bolt: 74 ft. lbs. (100 Nm)
 - 19. Install or connect the following:
 - · Cylinder head cover
 - Wheel well liners
 - Spark plugs
 - Battery

2007-08 Cooper

Intake

See Figures 27 through 33.

- 1. Before servicing the vehicle, refer to the precautions section.
 - Remove cylinder head cover.

- 3. Remove adjusting unit for intake camshaft.
 - 4. Remove intermediate lever.
 - 5. Remove exhaust camshaft.

** WARNING

The screws of the bearing bridge must not be opened. Releasing the bearing bridge will result in damage to the cylinder head.

→The bearing cap marked 5 is a thrust bearing.

6. Release screws of bearing caps 1 to 5.

- 7. Set all bearing caps down in special tool No. 11 4 481.
 - 8. Remove camshaft.

To install:

- 9. Clean all bearing points and lubricate with oil.
- 10. Check plain compression rings for damage and replace if necessary.
- 11. The plain compression rings have catches at the joint. Press plain compression rings apart upwards and downwards and remove towards front, being careful as they can break easily. Make sure they can move freely.

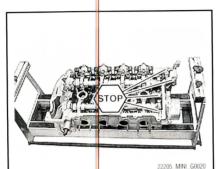
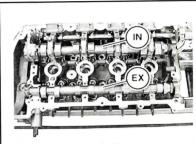


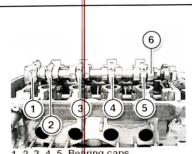
Fig. 27 DO NOT open bearing bridge screws



EX: Exhaust camshaft IN: Intake camshaft

22205 MINI G0023

Fig. 30 Camshaft identification



1, 2, 3, 4, 5. Bearing caps

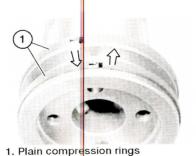
Camshaft

22205 MINI G0021

Fig. 28 Remove camshaft

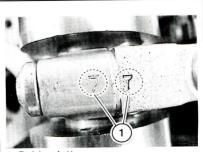


Fig. 31 Intake camshaft positioning



22205 MINI_G0022

Fig. 29 Plain compression rings



1. Pairing letters

22205 MINI G0025

Fig. 32 Pay attention to pairing letters

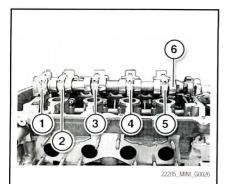


Fig. 33 Bearing cap tightening sequence

5. Release central bolt of intake adjustment unit.

** WARNING

The screws of the bearing bridge must not be opened. Releasing the bearing bridge will result in damage to the cylinder head.

** WARNING

Risk of damage to spark plug bores. Check special tool No. 11 9 652 for damage.

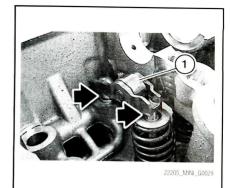


Fig. 38 Rocker arm positioning

** WARNING

Both camshafts have different identifications. Mixing up the two camshafts will result in engine damage.

- 12. Insert camshaft so that "IN" marking points upwards.
- 13. Position inlet camshaft so that cams point upwards at an angle.
- 14. Attach special tool No. 11 9 551 to twin surface.
- 15. Make sure plain compression rings cable can move freely.
- 16. All bearing caps are identified from 5 to 10
- 17. Tighten bearing caps from inside outwards. Tighten to 7 ft. lbs. (10 Nm).
 - 18. Adjust valve timing.
- 19. The remainder of installation is the reverse of removal.

Exhaust

See Figures 34 through 43.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove cylinder head cover.
 - 3. Remove vacuum pump.
- 4. Remove exhaust adjusting unit for exhaust camshaft.

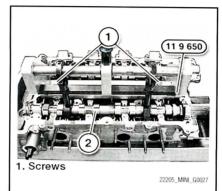
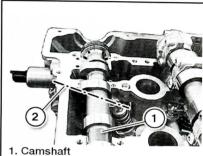


Fig. 35 Install special tool



- 2. Installation position

22205 MINI G0030

22205_MINI_G0023

Fig. 39 Camshaft positioning

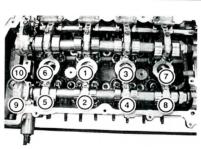


Fig. 36 Release bearing caps (shown without special tool for clarity)

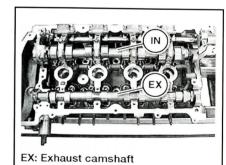


Fig. 40 Camshaft identification

IN: Intake camshaft

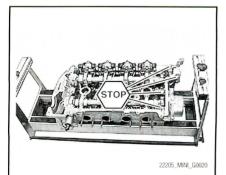
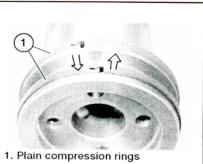
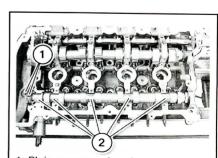


Fig. 34 DO NOT open bearing bridge screws



22205 MINI G0022

Fig. 37 Plain compression rings



- 1. Plain compression rings
- 2. Bearing points

22205_MINI_G0031

Fig. 41 Positioning plain compression rings

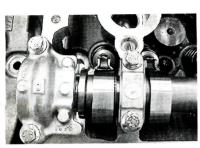


Fig. 42 Bearing bridge locations from 0 to 4

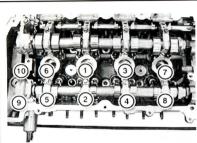


Fig. 43 Bearing bridge screw tightening sequence (shown without special tool for clarity)

- 6. Secure special tool No. 11 9 650 on cylinder head with screws in spark pluq
- 7. With special tool No. 11 9 650 installed, release bearing caps from 10 to 1.
- 8. Set all bearing caps down in special tool No. 11 4 480.
- 9. Check plain compression rings for damage and replace if necessary.
- 10. The plain compression rings have catches at the joint. Press plain compression rings apart upwards and downwards and remove towards front, being careful as they can break easily. Make sure they can move freely.
- →Removal on engine: Block engine with special tool No. 11 9 590.
- →Removed cylinder head: When using special tool No. 11 9 000, it will be necessary to remove the aluminum profile insert.

- 11. Before installing exhaust camshaft, make sure roller rocker arm is correctly seated HVCA element and valve.
- 12. Lubricate all bearing points with
- 13. Insert camshaft, paying close attention to installation position.

** WARNING

Both camshafts have different identifications. Mixing up the two camshafts will result in engine damage.

- 14. Make sure plain compression rings can move freely.
- 15. Align plain compressing rings in downward direction
- 16. Lubricate all bearing points with engine oil.
- 17. Secure special tool No. 11 9 650 on cylinder head with screws in spark plug holes.
 - 18. Fit all bearing bridges from 0 to 4.
- 19. Secure screws in sequence 1 to 10. Tighten to 7 ft. lbs. (10 Nm).
 - 20. Adjust valve timing.
- 21. The remainder of installation is the reverse of removal

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See Figures 44 through 56.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove cylinder head cover.
 - 3. Check timing
 - 4. Remove chain tensioner.

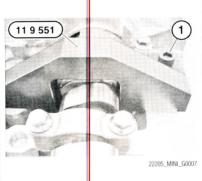


Fig. 44 Position camshaft tool

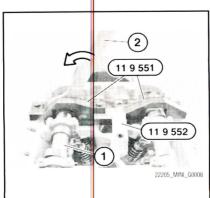


Fig. 45 Locking camshafts

- 5. To release central bolts, always use special tool No. 11 9 551 of exhaust camshaft.
- 6. Position special tool No. 11 9 551 on twin surface of exhaust camshaft.
- 7. Secure special tool No. 11 9 551 with a screw.

→ Check function of adjustment unit locking by rotating camshaft.

8. Mount special tool No. 11 9 551 on inlet and exhaust camshafts.

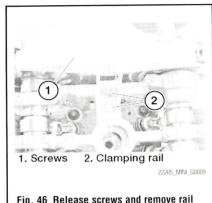


Fig. 46 Release screws and remove rail



Fig. 47 Release screw

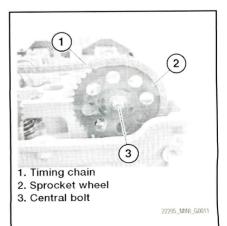
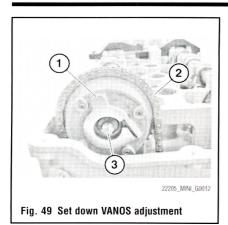


Fig. 48 Removing camshaft sprocket



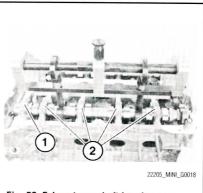


Fig. 53 Exhaust camshaft bearing caps

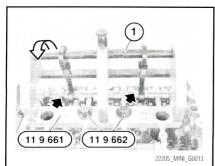


Fig. 50 Screw special tool into spark plug holes and turn intake camshaft eccentric shaft

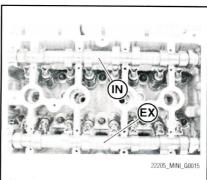


Fig. 54 Identifying intake and exhaust camshafts

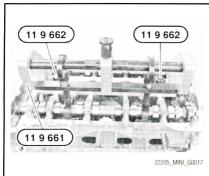


Fig. 51 Screw special tool into exhaust camshaft spark plug holes

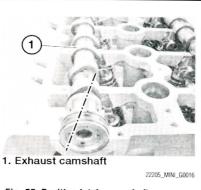


Fig. 55 Position intake camshaft

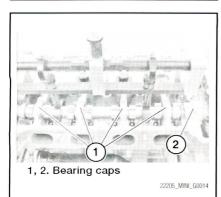


Fig. 52 Intake camshaft bearing caps

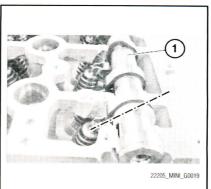


Fig. 56 Position exhaust camshaft

- 9. Screw in special tool No. 11 9 552 on cylinder head with a screw.
- 10. To release central bolts, always use special tool No. 11 9 551.
 - 11. Release screws.
 - 12. Remove clamping rail.
 - 13. Release screw.
 - 14. Release central bolt.
- 15. Feed out sprocket wheel from timing chain towards front.
 - 16. Release central bolt.
- 17. For exhaust camshaft, do not remove VANOS unit.
- 18. For intake camshaft, set down VANOS adjustment unit on special tool No. 11 4 480.
- ⇒With the cylinder head removed, it will be necessary to remove the aluminum profile insert when using special tool No. 11 9 000.
- 19. Screw special tool No. 11 9 661 with special tool No. 11 9 662 into spark plug holes.
- 20. For intake camshaft, turn eccentric shaft in direction of ring and lock.
 - 21. Release all screws on bearing caps.
- 22. Bearing cap No. 1 is a thrust bearing and has the number 0.
- 23. Bearing cap No. 2 is a thrust bearing and has the number 5.
- 24. All intake bearing caps are identified with numbers from 6 to 9.
- 25. All exhaust bearing caps are identified with numbers from 1 to 4.
- 26. Intake camshaft is identified with designation (IN), and exhaust camshaft is identified with the designation (EX).
- 27. Insert camshafts so that designations (IN and EX) can be read from above.

- 28. Position intake camshaft so that cam of the intake camshaft points upward at an angle.
- 29. Position exhaust camshaft so that cam of exhaust camshaft points inward at an angle.
- 30. The remainder of installation is the reverse of removal. Tighten to bearing caps to 7 ft. lbs. (10 Nm).
 - 31. Adjust valve timing

CRANKSHAFT FRONT SEAL

REMOVAL & INSTALLATION

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See Figures 57 through 59.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove A/C line from compressor.
 - 3. Remove vibration damper.

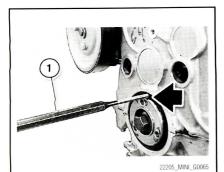
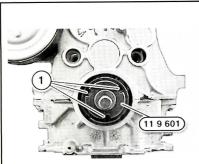


Fig. 57 Push PTFE ring in until it tilts out at the bottom



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Fig. 58 Install special tool on crankshaft

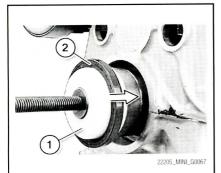


Fig. 59 Push PTFE ring over supporting ring

** WARNING

PTFE ring is supplied with a supporting ring. Supporting ring is required as an installation tool. Do not touch inner sealing face of PTFE ring with fingers (risk of damage).

** WARNING

Do not release central bolt. If the central bolt is released, the sprocket wheels of the timing chain and the oil pump will no longer be nonpositively connected to the crankshaft.

The camshafts to the crankshaft can warp (risk of damage).

- 4. Drive PTFE ring inwards with a drift until PTFE ring tilts outwards at bottom. Do not allow PTFE ring to slip inward.
- 5. Secure special tool No. 11 9 601 with screws to crank shaft and tighten to 11 ft. lbs. (15 Nm).

To install:

- 6. Apply a light coating of oil to special tool No. 11 9 601.
- 7. Position PTFE ring with supporting ring on special tool No. 11 9 601.
- 8. Push PTFE ring over supporting ring in direction of arrow up to crankcase.
- 9. Remove supporting ring from special tool No. 11 9 601. Supporting ring is no longer needed.
- 10. Draw in PTFE ring with special tool No. 11 9 602 in conjunction with special tool No. 11 9 603 until flush.
- 11. The remainder of installation is the reverse of removal.

CYLINDER HEAD

REMOVAL & INSTALLATION

2006 Cooper Coupe

See Figures 60 through 65.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain the cooling system.
 - 3. Remove or disconnect the following:
 - Wheel well liners
 - Battery and battery container
 - Vent hose and engine control DME connector from cylinder head
 - Fuel rail cover
 - Fuel injector wiring harness (move aside)
 - Heater hoses from cylinder head
 - Top hose from thermostat housing
 - Exhaust manifold from block

- Spark plugs
- Fuel line from fuel rail (plug openings)
- · Lines from stabilizer bar bracket
- Vacuum line to brake booster from intake manifold
- · CMP sensor connector
- Dinstick
- 4. Remove the intake manifold bolts in reverse of the order as shown (start with bolt 5), then lift the manifold over the dipstick tube.
- 5. Disconnect the line from the filler neck to the expansion tank, then the engine wiring harness can be moved around the thermostat housing.
- 6. Tie back the intake manifold from the cylinder head.
 - 7. Remove or disconnect the following:
 - Engine stabilizer bar bracket
 - Oxygen sensor plug connector
 - Holder for oxygen sensor plug from cylinder head
 - · Coolant distributor pipe screw
 - Coolant temperature sensor connector
- 8. Support the engine with a trolley jack and rubber pad on the oil pan. Use caution so oil pan is not damaged.
- 9. Remove the engine carrier bolts and engine mount nut.

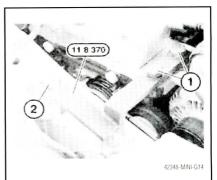


Fig. 61 Mounting special holding tool on engine—Cooper Coupe

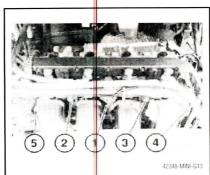


Fig. 60 Showing intake manifold bolt tightening sequence—Cooper Coupe

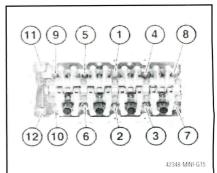


Fig. 62 Cylinder head bolt tightening sequence—Cooper Coupe

- 10. Remove the engine carrier.
- 11. Use a special tool, 11-8-200, and remove the hydraulic engine mount.
- 12. Mount a special engine holding tool. 11-8-370, on the cylinder block and body fixtures, as shown.
 - 13. Remove the camshaft sensor.
- 14. Remove the plugs from the cover on each side of the camshaft.
- 15. Rotate the crankshaft until the triangular adjustment mark on the camshaft gear is at 12 o'clock. Apply a paint reference

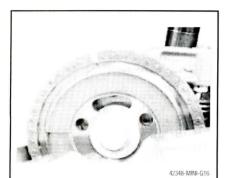


Fig. 63 Aligning camshaft and timing chain reference marks-Cooper Coupe

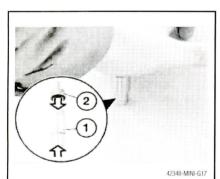


Fig. 64 Reassembling timing chain tensioner clamping fixture—Cooper Coupe

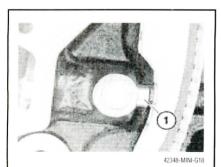


Fig. 65 Showing the released position of the timing chain clamping fixture (with tension on the timing chain)-Cooper Coupe

mark from camshaft and across timing chain for reassembly reference.

→ The brass-colored chain links are of no importance to the timing.

- 16. Install a special clamping fixture tool, 11-8-250, to camshaft gear. Slacken, but do not remove the center bolt from the camshaft gear.
- 17. Remove the wiring harness holder, timing chain tensioner and clamping fixture tool.
- 18. Remove center bolt from camshaft gear.
- 19. Remove the camshaft gear from the timing chain and secure the chain to prevent it from falling.
- 20. Remove the bolts from timing chain guides (through the plug openings).
- 21. Remove the clamping rail and timing chain guides.
- → The timing chain cover is designed so that the timing chain can remain on the crankshaft gear without any gear teeth being skipped.

** CAUTION

DO NOT rotate crankshaft.

22. Remove the cylinder head retainers 11 and 12 first, then remove the cylinder head bolts in reverse of the order shown.

23. Remove the cylinder head.

24. Clean all sealing material from mating faces

** CAUTION

There must be no oil in the cylinder head bolt holes in the block and timing case cover or there is a possibility of cracking and distorting torque values.

- 25. Install a new cylinder head gasket.
- 26. Position the cylinder head onto the block and install new cylinder head bolts (do not clean compound applied to new bolts)
- 27. Tighten cylinder head bolts, following the sequence shown for bolts 1 through 10, in 2 steps, to the following:
 - a. Step 1: 30 ft. lbs. (40 Nm)
 - b. Step 2: Additional 90 degrees
- 28. Tighten cylinder head retainers number 11 and 12 to 21 ft. lbs. (28 Nm).
 - 29. Install or connect the following:
 - Clamping rail and timing chain quides
 - Chain guide bolts; torque to 21 ft. lbs. (28 Nm)

- · Timing chain onto camshaft gear
- Center bolt in camshaft gear
- 30. Align the camshaft and timing chain paint marks made during removal.
- 31. Install camshaft gear holding special tool, 11-8-250, then torque center camshaft gear bolt to 75 ft. lbs. (102 Nm).
- 32. Move the timing chain tensioner into transition position. Place the timing chain tensioner clamping fixture (1) on a level surface and remove the cap (2).
- 33. Place palm of hand against the clamping fixture and exert continuous pressure until fixture is completely compressed. Replace clamping fixture cap. Position the clamping fixture in place.
- 34. Install the timing chain tensioner and torque screw plug to 46 ft. lbs. (63 Nm). Install the cable holder.

** CAUTION

Timing chain tensioner is in the transition position. Ensure timing chain is correctly arranged inside the channel of the timing chain guides.

- 35. Use a prybar to lever the clamping rail until the timing chain tensioner applies tension to the timing chain (do not lever directly on the timing chain).
- 36. Exam the released position of the clamping fixture as shown.
- 37. Complete installation in reverse of the removal procedure.
 - 38. Refill the cooling system.

2006 Cooper S Coupe

See Figure 66.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Disconnect or remove the following:
 - Battery
 - Intercooler
 - ECU connectors
 - Intake filter housing

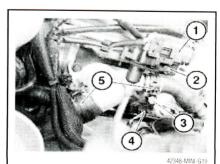


Fig. 66 Showing components to remove from coolant housing area of engine-Cooper S Coupe

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- 3. Slacken the module front end (MFE) and install the extension tools, 11–8–401/2 to keep MFE extended for access.
 - 4. Disconnect or remove the following:
 - · Throttle assembly
 - Cylinder head cover
 - · Fuel tank venting valve
 - Fuel line from fuel rail (quick-disconnect fitting); plug openings

** CAUTION

Fuel system may be under pressure; be prepared to open line cautiously and ready to catch spilling fuel.

- 5. Release both pipes from the engine stabilizer bracket and move to one side.
 - 6. Disconnect or remove the following:
 - · Intake manifold
 - Supercharger outlet pipe
 - Engine stabilizer support bracket
 - · Cap from coolant reservoir
 - · Drain the cooling system
 - Oxvgen sensor connector (1)
 - Oxygen sensor connector bracket from cylinder head (2)
 - Coolant rail support bolt (3)
 - Coolant sensor connector (4)
 - Coolant hoses (5)
- 7. Disconnect the camshaft (CMP) sensor connector.
 - 8. Remove the dipstick.
- Remove the exhaust heat shield and exhaust manifold bolts from cylinder head.
 - 10. Remove the spark plugs.
- 11. Support the engine with a suitable jack.
- 12. Remove the engine mount support bracket.
- 13. Remove the engine hydra-mount, with special tool, 11–8–200.
- 14. Install a special engine retainer brace, 11–8–370, to cylinder block and engine mount chassis location.
 - 15. Remove the CMP sensor.
- 16. Remove both plugs from the front of the cylinder head.
 - 17. Remove both fender well liners.
- 18. Rotate the engine until the camshaft gear triangular timing mark is at the 12 o'clock position. Make a paint mark across the timing mark and timing chain for reassembly reference.
- →The copper colored link has no relation to timing. The design of the timing chain cover will allow the chain to stay on the crankshaft gear without skipping any teeth.

** CAUTION

DO NOT rotate the engine with timing chain disconnected.

- 19. Install cams aft gear holding tool, 11–8–250, then slacken, but do not remove, the camshaft gear center bolt.
- 20. Remove the wiring harness holder, timing chain tensioner and clamping fixture tool.
- 21. Remove center bolt from camshaft gear
- 22. Remove the camshaft gear from the timing chain and secure the chain to prevent it from falling.
- 23. Remove the polts from timing chain quides (through the plug openings).
- 24. Remove the clamping rail and timing chain guides.
- →The timing chain cover is designed so that the timing chain can remain on the crankshaft gear without any gear teeth being skipped.

** CAUTION

DO NOT rotate crankshaft.

- 25. Remove the cylinder head retainers 11 and 12 first, then remove the cylinder head bolts in reverse of the order shown.
 - 26. Remove the cylinder head.

To install:

27. Clean all sealing material from mating faces.

** CAUTION

There must be no oil in the cylinder head bolt holes in the block and timing case cover or there is a possibility of cracking and distorting torque values.

- 28. Install a new cylinder head gasket.
- 29. Position the cylinder head onto the block and install new cylinder head bolts (do not clean compound applied to new bolts).
- 30. Tighten cylinder head bolts, following the sequence shown for bolts 1 through 10, in 2 steps, to the following:
 - a. Step 1: 30 ft. lbs. (40 Nm)
 - b. Step 2: Additional 90 degrees
- 31. Tighten cylinder head retainers number 11 and 12 to 21 ft. lbs. (28 Nm).
 - 32. Install or connect the following:
 - Clamping rail and timing chain guides
 - Chain guide bolts; torque to 21 ft. lbs. (28 Nm)
 - Timing chain onto camshaft gear
 - Center bolt in camshaft gear

- 33. Align the camshaft and timing chain paint marks made during removal.
- 34. Install camshaft gear holding special tool, 11–8–250, then torque center camshaft gear bolt to 75 ft. lbs. (102 Nm).
- 35. Move the timing chain tensioner into transition position. Place the timing chain tensioner clamping fixture (1) on a level surface and remove the cap (2).
- 36. Place palm of hand against the clamping fixture and exert continuous pressure until fixture is completely compressed. Replace clamping fixture cap. Position the clamping fixture in place.
- 37. Install the timing chain tensioner and torque screw plug to 46 ft. lbs. (63 Nm). Install the cable holder.

** CAUTION

Timing chain tensioner is in the transition position. Ensure timing chain is correctly arranged inside the channel of the timing chain guides.

- 38. Use a prybar to lever the clamping rail until the timing chain tensioner applies tension to the timing chain (do not lever directly on the timing chain).
- 39. Exam the released position of the clamping fixture as shown.
- 40. Complete installation in reverse of the removal procedure.
 - 41. Refill the cooling system.

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See Figures 67 through 73.

- 1. Before servicing the vehicle, refer to the precautions section.
- Fit new cylinder head screws.
- **→**Do not wash off bolt coating.
- →There must not be any coolant, water or oil present in the pocket holes (risk of corrosion and cracking).
 - 2. Remove exhaust system.

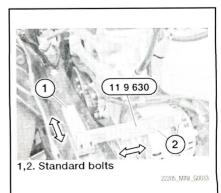
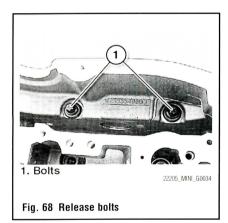
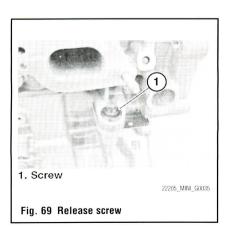


Fig. 67 Secure special tool

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- 3. Drain coolant.
- 4. Drain engine oil.
- 5. Remove exhaust manifold.
- 6. Remove intake air manifold.
- 7. Remove oil dipstick.
- 8. Detach coolant hoses from cylinder head.
 - 9. Remove cylinder head cover.
- 10. Remove inlet and exhaust adjustment unit.
- 11. Secure crankshaft with special tool No. 11 9 590.
- → Remove and install cylinder head in installed state.
 - 12. Suspend engine with engine crane.
- → Remove and install cylinder head in installed state.
- 13. Move front panel into assembly position.
- 14. Release upper alternator screws, do not remove alternator.
 - 15. Remove right engine mount.
- 16. Secure special tool No. 11 9 630 with standard bolts.
 - 17. Release bolts
- →If the timing chain is stowed in the gearcase, the crankshaft must no





longer be rotated. The timing chain may jam on the crankshaft gear.

- 18. Release screw.
- 19. Release cylinder head bolts with special tool No. 11 2 250.
- 20. Release cylinder head bolts from outside inward (10 to 1).
- →Remove shims with a magnet.
- → Do not use any metal-cutting tools for gasket removal.
- 21. Use special tool No. 11 4 471 to remove coarse gasket remnants from sealing faces of cylinder head and crankcase.
- 22. Remove fine gasket remnants with special tool No. 11 4 472.
- →There must not be any coolant, water or oil present in the pocket holes (risk of corrosion and cracking).
 - 23. Clean all pocket holes.

To install:

- 24. Replace cylinder head gasket.
- Fit new cylinder head screws. Do not wash off bolt coating. Attach shims to cylinder head bolts.

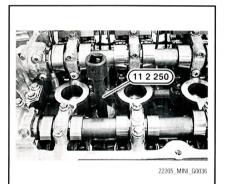


Fig. 70 Release cylinder head bolts

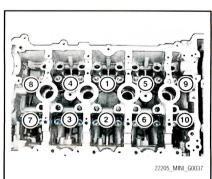
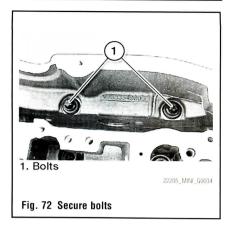


Fig. 71 Cylinder head bolts (illustration shows camshafts removed)





** WARNING

Do not allow shims to drop into engine.

- 25. Secure cylinder head bolts from inside outward (1 to 10), using the following sequence:
 - Step 1: Tighten to 22 ft. lbs. (30 Nm)
 - Step 2: Turn angle 90°
 - Step 3: Turn angle 90°
- 26. Secure bolts, using the following sequence:
 - Step 1: Tighten to 11 ft. lbs. (15 Nm)
 - Step 2: Turn angle 90°
 - Step 3: Turn angle 90°
- 27. Tighten the screw to 22 ft. lbs. (30 Nm).
- 28. The remainder of installation is reverse of removal.

ENGINE ASSEMBLY

REMOVAL & INSTALLATION

2006 Cooper Coupe

See Figures 74 through 77.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Disconnect the battery and battery container.

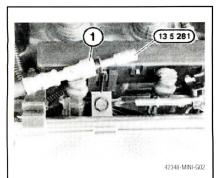


Fig. 74 Releasing the fuel line—Cooper Coupe models

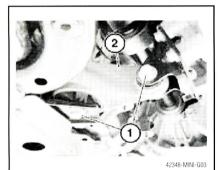


Fig. 75 Showing location of engine stabilizer bar—Cooper Coupe models

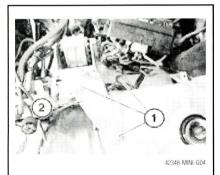


Fig. 76 Showing left transmission bracket—Cooper Coupe models

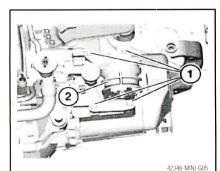


Fig. 77 Showing right transmission bracket—Cooper Coupe models

- 3. Properly relieve the fuel system pressure.
 - 4. Remove or disconnect the following:
 - Front bumper cover
 - Bumper bracket
 - Air cleaner housing
 - Clutch cylinder
 - Top stabilizer bar bracket
 - Exhaust manifold with catalytic converter
 - Both drives hafts
 - Auxiliary drive belts
 - 5. Drain the codling system.
- 6. Remove the upper engine hood support and install a special support tool, 51–2–160.
- 7. Loosen the retainers for the modular front end and insert pracing tools,
- 11-8-401/2, to provide access room.
 - 8. Remove or disconnect the following:
 - Coolant hoses
 - Heater hoses
 - Overflow hose
- 9. Release the fuel line (1), then plug the line opening.

** CAUTION

Fuel may still be under pressure. Use caution when releasing any fuel lines. Prepare to catch fuel spillage.

- 10. Remove the starter heat shield.
- 11. Release the brake booster line connection at the booster by pressing downward on clip ring and pulling line upward.
 - 12. Remove or disconnect the following:
 - Plug connector from fuse box
 - Fuse box (position aside)
 - Grounding cable from left spring strut
 - Circular connector (twist upper and lower palves in opposite directions)
 - Transmission shift cables from retaining clips and ball connections
 - Shift control housing
 - Engine stabilizer brace
 - Steering pump motor connector
 - A/C compressor connector and 2 retaining bolts (position compressor aside)
 - Both transmission brackets
 - 13. Install a spedial holding tool,
- 11-8-352, on transmission as a lifting eye.
 - 14. Install a spedial lifting tool,
- 11–8–351, on front of engine as a lifting eye.
- 15. Attach engine lifting equipment to lifting eyes.
- 16. Remove engine mount retaining nut and remove the engine.

To install:

- 17. Install in reverse of removal procedure.
 - 18. Torque retainers to the following:
 - Engine mount retaining nut: 50 ft. lbs. (68 Nm)
 - Mount bracket to transmission bolts: 49 ft. lbs. (66 Nm)
 - A/C compressor mounting bolts: 18 ft. lbs. (25 Nm)
 - Engine stabilizer bar bolts: 74 ft. lbs. (100 Nm)
 - Shift cable bracket bolt: 16 ft. lbs. (22 Nm)
 - Ground cable at left strut: 7 ft. lbs. (9 Nm)
- 19. When engine is fully installed and assembled, refill transmission and cooling systems.

2006 Cooper S Coupe

See Figures 78 through 80.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Install the intercooler protector,
- 11–8–480 to ensure intercooler is not damaged during engine removal and installation.
- 3. Disconnect the battery and battery container.
- 4. Properly relieve the fuel system pressure.
 - 5. Remove or disconnect the following:
 - Air cleaner housing
 - Auxiliary drive belt
 - 6. Drain the transmission.
- 7. Remove the lower engine stabilizer bar bracket bolts and remove the bracket.
- 8. Disconnect the steering pump motor connector.
 - 9. Remove the crush tubes as follows:
 - a. Remove the bumper and bumper carrier.
 - b. Remove the bolt securing the impact tube to the front end module.
 - c. Remove the bolts retaining the impact tube to the chassis subframe.
 - d. Remove the impact (crush) tube.
- 10. Loosen the retainers for the modular front end and insert bracing tools,
- 11-8-401/2, to provide access room.
 - 11. Remove or disconnect the following:
 - Subframe
 - Driveshafts
 - · Exhaust manifold
 - · Starter motor heat shield
 - · Starter motor connections
 - Oil pressure connector
 - Wiring harness from brackets on starter motor and cooling pipe (note routing for installation; move wiring harness aside)

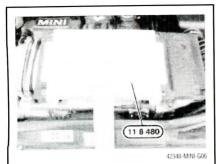


Fig. 78 Showing installed position of the intercooler protector—Cooper S Coupe models

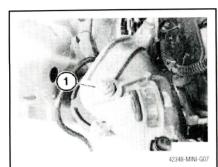


Fig. 79 Identifying location of engine mount retaining nut-Cooper S Coupe models

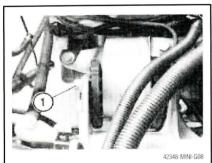


Fig. 80 Identifying location of transaxle-to-upper mount retaining bolt-Cooper S Coupe models

- Reverse lamp connector from transaxle
- Intercooler
- Throttle valve
- Tank venting valve lower pipe from stabilizer bracket
- Fuel line from fuel rail (quickdisconnect fitting); plug openings
- Fusebox cover and connector from fusebox
- Grounding cable from left spring
- Circular connector (twist upper and lower halves in opposite directions)

- · Drain cooling system
- Pipes from heater matrix
- Expansion tank pipes at heater pipe iunction
- Upper radiator hose
- Top engine stabilizer bracket
- Clutch slave cylinder
- Transmission shift cables from retaining clips and ball connections and bracket
- A/C compressor connector and retaining bolts (position compressor aside)
- · MAP sensor connector (near water housing)
- Coolant hose from water housing 12. Install a special lifting tools,
- 11-8-351 and 11-8-351, as a lifting eye.
- 13. Remove the supercharger
- inlet retaining bolt and release the hose
- 14. Remove the supercharger inlet pipe to access and disconnect additional hose
- 15. Remove the brake booster pipe from the engine and the slave cylinder pipe from the transaxle (move aside).
- 16. Attach engine lifting equipment to lifting eyes.
- 17. Remove engine mount retaining nut and remove the engine.
- 18. Remove the transaxle-to-upper mount retaining bolt.
 - 19. Lower and remove the engine.

- 20. Install in reverse of removal procedure.
 - 21. Torque retainers to the followina:
 - Engine mount retaining nut: 50 ft. lbs. (68 Nm)
 - Mount bracket to transmission bolts: 49 ft. lbs. (66 Nm)
 - Coolant pipe to cylinder head: 18 ft. lbs. (25 Nm)
 - A/C compressor mounting bolts: 18 ft. lbs. (25 Nm)
 - Ground cable at left strut: 7 ft. lbs. (9 Nm)
 - Starter motor to transaxle bolts: 63 ft. lbs. (85 Nm)
 - Alternator connection on starter: 10 ft. lbs. (14 Nm)
 - Starter motor heat shield bolts: 7 ft. lbs. (9 Nm)
 - Crush tube to Subframe bolts: (165 Nm)
 - Engine stabilizer bar bolts: 74 ft. lbs. (100 Nm)
- 22. When engine is fully installed and assembled, refill transmission and cooling systems.

2007-08 Cooper and Cooper S

See Figures 81 through 83.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove exhaust system.
 - 3. Drain engine oil.
 - 4. Disconnect negative battery lead.
 - 5. Remove both drive shafts.
 - 6. Remove air cleaner housing.
 - Remove fan cowl with electric fan.
 - 8. Detach all coolant hoses from engine.
- 9. Detach vacuum line from brake booster.

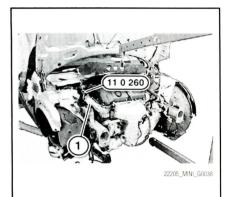


Fig. 81 Attach lifting tool to engine



Fig. 82 Attach lifting tool to engine

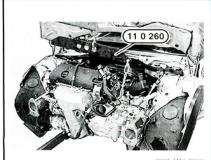


Fig. 83 Remove engine

- 10. Unfasten engine wiring harness and lav to one side.
 - 11. Remove complete front panel.
- 12. Attach special tool No. 11 0 260 to lifting eye at engine end.
- 13. Attach special tool No. 11 0 260 to lifting eye at transmission end.
- 14. Release transmission and engine mounts.
- 15. Remove engine with special tool No. 11 0 260 towards front.

- 16. Installation is the reverse of removal.
- 17. Check function of DME.

EXHAUST MANIFOLD

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Move front end into assembly position.
 - 3. Remove or disconnect the following:
 - · Exhaust system from manifold
 - Both oxygen sensor connectors
 - Heat shield
 - · Exhaust manifold bolts
 - Exhaust manifold

To install:

- 4. Clean all mating faces.
- 5. Install new gaskets
- 6. Position the exhaust manifold and torque retaining bolts to 18 ft. lbs. (24 Nm)
- 7. The remainder of installation is the reverse of removal.

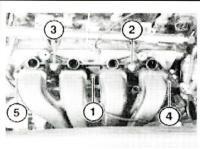
INTAKE MANIFOLD

REMOVAL & INSTALLATION

2006 Cooper Coupe

See Figure 84.

1. Before servicing the vehicle, refer to the precautions section.



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Fig. 84 Showing intake manifold bolt removal and tightening sequence—Cooper Coupe

2. Properly relieve the fuel system pressure.

** CAUTION

Fuel system may still be under pressure; use caution when disconnecting any fuel system components. Be prepared to catch fuel spillage.

- 3. Remove or disconnect the following:
 - Battery
 - Air cleaner housing
 - Throttle assembly
 - Cover from fuel rail
 - Brake boos er line from intake manifold (push attaching ring down to expose line)
 - Crankcase vent valve from inspection hole cover
 - Fuel line from fuel rail (quickdisconnect attachment)
 - Plug connector from intake air temperature/manifold air pressure sensor (TMAP)
 - Knock sensor plug from fuel rail wiring harness
 - Tank vent line and unclip at fuel rail
 - Vacuum line from intake manifold
- Retaining screws of fuel rail
- Injectors and fuel rail (plug all openings)
- Support or wire fuel rail assembly out of the way
- Dipstick
- Coolant line below intake manifold
- 4. Remove the intake manifold bolts, starting from the center and working outward in an alternating pattern.
 - 5. Remove the intake manifold

To install:

- 6. Check all intake manifold gaskets and replace if necessary.
- 7. Install intake manifold and torque bolts to 19 ft. lbs. (26 Nm), in the sequence shown
 - 8. Install or connect the following:
 - Coolant line below intake manifold
 - Dipstick
 - Fuel rail and injectors
 - Intake manifold vacuum line
 - Tank venting line on fuel rail
 - Knock sensor plug to fuel rail wiring harness
 - Connector to intake air temperature/manifold air pressure sensor (TMAP)
 - Fuel line to fuel rail
 - Crankcase vent valve to inspection hole cover
 - Brake booster line to intake manifold

- · Fuel rail cover
- Throttle assembly
- Air cleaner housing
- Battery

2006 Cooper S Coupe

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain the cooling system
- 3. Properly relieve the fuel system pressure.

** CAUTION

Fuel system may still be under pressure; use caution when disconnecting any fuel system components. Be prepared to catch fuel spillage.

- 4. Remove or disconnect the following:
 - Battery
 - Air cleaner housing
 - Throttle assembly
 - · Fuel injector rail
 - Engine vent control valve
 - Coolant hose from upper connection at intake manifold
 - · Knock sensor plug from manifold
 - Air intake sensor connector at manifold
 - Top tank vent valve line
 - TMAP sensor connector
- 5. Remove the intake manifold nuts, starting from the center and working outward in an alternating pattern.
 - 6. Remove the intake manifold

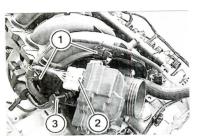
To install:

- 7. Position the intake manifold and install the nuts. Torque the nuts in an alternating pattern working outward from the center to 19 ft. lbs. (26 Nm).
 - 8. Install or connect the following:
 - TMAP sensor connector
 - Top tank vent valve line
 - Air intake sensor connector at manifold
 - Knock sensor plug from manifold
 - Coolant hose from upper connection at intake manifold
 - · Engine vent control valve
 - Fuel injector rail
 - Throttle assembly
 - · Air cleaner housing
 - Battery
 - 9. Refill the cooling system.

2007-08 Cooper

See Figures 85 through 90.

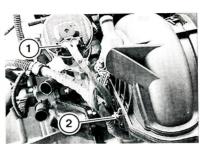
- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove suction filter housing
 - 3. Remove engine cover.



- 1. Engine wiring harness
- 2. Plug connection
- 3. Plug connection on tank valve.

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Fig. 85 Disconnect wiring harness and plug connections



- 1. Plug connection
- 2. Engine wiring harness

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Fig. 88 Unfasten engine wiring harness

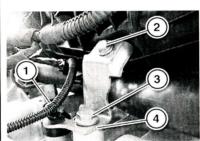




- 1. Plug connection
- 2. Tank vent valve

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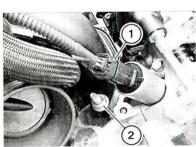
Fig. 86 Disconnect plug connection and tank vent valve



- 1. Cable
- 2. 3. Screws
- 4. Holder

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Fig. 89 Release cable, screws, and take off holder

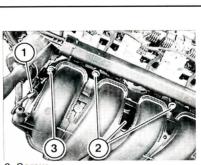


- 1. Plug connection on solenoid valve

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Fig. 87 Disconnect plug connection on solenoid valve

- 4. Unfasten engine wiring harness on intake manifold.
 - 5. Disconnect plug connection.
- 6. Disconnect plug connection on tank vent valve.
 - 7. Disconnect plug connection.
 - 8. Release tank vent valve.
- 9. Disconnect plug connection on solenoid valve.



- 2. Screw
- 3. Nuts

22205 MINI G0046

Fig. 90 Release screw and nuts

- 10. Release engine breathers and hold to one side.
 - 11. Loosen nut.
 - 12. Disconnect plug connection.
- 13. Unfasten engine wiring harness on intake manifold.
- 14. Release cable at intake manifold holder.
 - 15. Release screws.

- 16. Take off holder.
- 17. Release screw.
- 18. Unscrew nuts.

To install:

- 19. Replace all seals.
- 20. The remainder of installation is the reverse of removal. Torque the intake manifold to cylinder head to 11 ft. lbs. (15 Nm).

2007-08 Cooper S

See Figures 91 through 93.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Disconnect the negative battery cable.

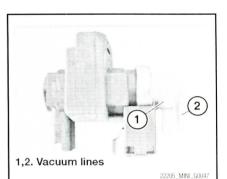
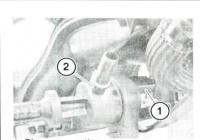


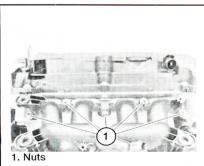
Fig. 91 Disconnect plug connection at EPPC (picture shows EPPC removed)



- 1. Plug connection
- 2. Tank vent valve

22205 MINI G0048

Fig. 92 Detach hose from tank vent valve



22205 MINI G0049

Fig. 93 Unscrew nuts

- 3. Remove suction filter housing.
- 4. Disconnect vacuum lines on vacuum connection.
- 5. Disconnect plug connection at EPPC.
- 6. Disconnect plug connection on tank vent valve.
 - 7. Detach hose from tank vent valve.
 - 8. Unscrew nuts

- →OUT connector on EPPC is identified with a green ring.
- →Vacuum line is fitted with a green ring (OUT).
- → Vacuum line without green ring (VAC).
 - 9. Replace all seals.
- 10. The remainder of installation is the reverse of removal. Torque the intake manifold to cylinder head to 11 ft. lbs. (15 Nm).

OIL PAN

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

See Figures 94 through 96.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove or disconnect the following:
 - Battery
 - · Alternator drive belt
 - Drain engine oil

** CAUTION

Cover the alternator to prevent oil from dripping on it.

- 3. Remove the impact (crush) tube as follows:
 - a. Remove the bumper and bumper carrier.
- 2

Fig. 94 Showing location of impact tube retaining bolts

- b. Remove the bolt securing the impact tube to the front end module.
 - c. Remove the impact tube.
- 4. Slacken retainers from modular front end (MFE) and push MFE outward and restrain with special tools 11–8–401/2.
 - 5. Detach the A/C compressor connector.
- 6. Remove the compressor and lower out of the way. Secure it to MFE.
 - 7. Unclip high-pressure A/C hose.
 - 8. Remove or disconnect the following:
 - Lower engine stabilizer bar
 - Bracket from oil pan
 - 2 forward transaxle—to—oil pan bolts and upper bolts (1)
- 9. Remove the oil pan bolts in the specified sequence

To install:

- 10. Ensure mating surfaces are clean.
- 11. Install a new gasket and position the oil pan in place.
- 12. Install and tighten the oil pan bolts to 23 ft. lbs. (31 Nm).
- 13. Install and tighten oil pan—to—transaxle bolts to 23 ft. lbs. (31 Nm).

→Shorter bolts go in lower locations.

14. Install the lower stabilizer—to—oil pan holder and torque bolts to 74 ft. lbs. (100 Nm).

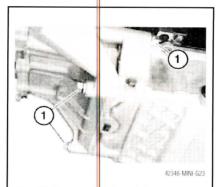


Fig. 95 Showing location of the transaxle-to-oil pan bolts to remove

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Fig. 96 Oil pan bolt removal and installation sequence

- 15. Install the lower engine stabilizer bar to oil pan and torque the bolts to 33 ft. lbs. (45 Nm).
- 16. Install the A/C compressor and torque the mounting bolts to 18 ft. lbs. (25 Nm).
- 17. Reconnect the A/C compressor connector.
- 18. Restore the MFE to normal position. Torque the bolts as follows:
 - M8x30 bolts: 16 ft. lbs. (22 Nm)
 - m6x16 bolts: 3 ft. lbs. (5 Nm)
- 19. Install the impact tube and torque the bolts to 74 ft. lbs. (100 Nm).
- 20. Install the bumper and bumper carrier. Torque nuts and bolts to 16 ft. lbs. (22 Nm).
 - 21. Install or connect the following:
 - Splash guard
 - · Alternator drive belt
 - Battery
- 22. Refill the engine oil. Start the engine and wait until the oil indicator lamp goes out. Switch the engine off and wait about 5 minutes, then recheck the oil level.

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See Figure 97.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain engine oil.
 - 3. Release oil pan bolts in area of line.
- 4. Release screw over exhaust manifold with special tools No. 11 9 582 and No. 11 9 581.
- 5. Clean sealing face with special tool No. 11 4 470.
- 6. Remove protruding or surplus sealing beads with a suitable tool.

- → Do not use adhesive sealing bead.
- →Do not use liquid seal.
- →A metal substrate gasket is available for repairs. See manufacturer's part's service.

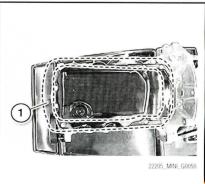


Fig. 97 Oil pan bolts

7. Installation is the reverse of removal. Tighten oil pan bolts to 9 ft. lbs. (11 Nm).

OIL PUMP

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

See Figure 98.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain the engine oil.
 - 3. Remove or disconnect the following:
 - Negative battery cable
 - Timing chain cover
 - Oil pump cover in reverse of order shown
 - Oil pump

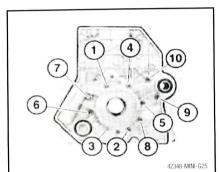


Fig. 98 Showing oil pump cover bolt tightening sequence

To install:

- 4. Check oil pump gears, pressure relief valve and housing for signs of wear or damage.
 - 5. Install or connect the following:
- 6. Fill the rotor cavity with clean engine oil before installing the oil pump.
 - Oil pump
 - Oil pump cover; torque bolts to 13 ft. lbs. (18 Nm)
 - · Timing chain cover
 - Negative battery cable
 - 7. Fill the engine with clean oil.
- 8. Start the vehicle and check for leaks, repair if necessary.

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See Figures 99 and 100.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain the engine oil.
 - 3. Remove oil pan.
 - 4. Pull off cover in direction of arrow.
- 5. Grip crankshaft central bolt to release central bolt.

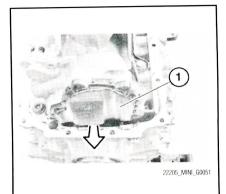
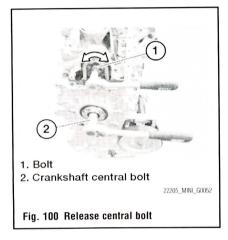


Fig. 99 Cover removal



6. Release bolts and fuel pump.

To install:

7. Installation is the reverse of removal. Tighten oil pump bolts to 18 ft. lbs. (25 Nm).

PISTON AND RING

POSITIONING

See Figures 101 through 103.

→Offset position of ring end gaps by 120° from each other, but not above piston pin boss.

REAR MAIN SEAL

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

The rear main bearing oil seal can be replaced after the transmission.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain the transmission fluid.
 - 3. Remove or disconnect the following:
 - · Negative battery cable
 - Transmission

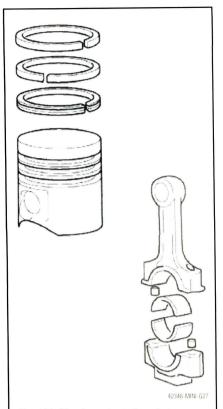
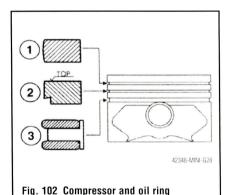


Fig. 101 Showing orientation of piston, rings and connecting rod



locations

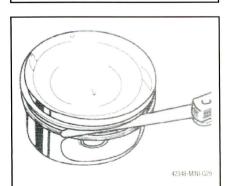


Fig. 103 Showing piston positioning arrow pointing toward front of block

- Clutch release bearing, bolts and guide tube (with seal)
- → Seal and guide tube are supplied as an assembly.

- 4. Rape input shaft splines to protect them during seal installation.
- 5. Coat the sealing lips of the new seal with oil.
 - 6. Install or connect the following:
 - New seal into transaxle housing; torque guide sleeve bolts to 4 ft. lbs. (6 Nm)
 - · Clutch release bearing
 - Transmission
 - · Negative battery cable
 - 7. Fill the transmission with new fluid.
- 8. Start the engine and check for oil leaks.
 - 9. Check and top off all fluid levels.

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- 1. Remove transmission.
- 2. Remove flywheel.
- 3. Break off PTFE ring with a drift.

To install:

- 4. Secure special tool No. 11 9 611 with supplied screws to crankshaft.
- 5. Position PTFE ring with supporting ring on special tool No. 11 9 611.
- 6. Push PTFE ring in direction of arrow over supporting ring onto crankshaft.
 - 7. Attach special tool No. 11 9 612.
- 8. Draw in PTFE ring with special tool No. 11 9 613.
- 9. Screw in special tool No. 11 9 612 up to engine block.
- 10. The remainder of installation is the reverse of removal.

TIMING CHAIN, SPROCKETS, FRONT COVER AND SEAL

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

See Figure 104.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain the engine oil.
 - 3. Remove or disconnect the following:
 - Negative battery cable
 - Vibration damper
 - Alternator drive belt tensioner and belt
 - Front impact tube
- 4. Slacken the modular front end (MFE) retainers and restrain MFE outward with special tools 11–8–401/2.

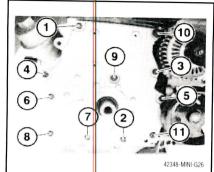


Fig. 104 Timing cover bolt tightening sequence

- 5. Remove the water pump bolts and move the pump aside so front cover is accessible.
- 6. Remove timing chain cover bolts in reverse of sequence shown.

→Pay attention to the location of the Torx and oval-head bolts.

7. Remove O-ring seals and housing seal.

To install:

- 8. Clean all mating surfaces.
- 9. Install new timing chain cover seals.

If oil pump was removed, fill the rotor cavity with clean engine oil before installing the oil pump.

- 10. Install timing chain cover. Install and torque the bolts, in the sequence shown, as follows:
 - Torx bolts: 9 ft. lbs. (12 Nm)
 - Oval head bolts: 13 ft. lbs. (18 Nm)
 - M6 bolts: 9 ft. lbs. (12 Nm)
- 11. Install water pump and torque the mounting bolts to 41 ft. lbs. (56 Nm) plus an additional 90 degrees.
 - 12. Restore MFE to its normal position.
 - 13. Install the impact tube.
- 14. Install the bett tensioner, then install the auxiliary drive belt.
 - 15. Install the vibration damper.
 - 16. Connect the negative battery cable.
 - 17. Refill the engine oil.

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See Figures 105 through 114.

- → Modified procedure for timing adjustment.
- →The timing is not determined at firing TDC of cylinder No. 1.
- →All pistons are in the 90° position.
- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove cylinder head cover.

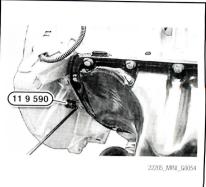
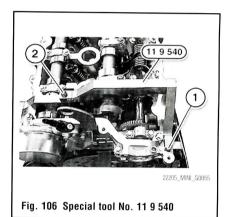
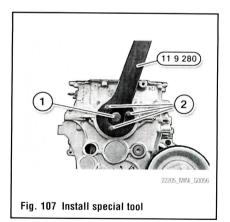


Fig. 105 Special tool No. 11 9 590





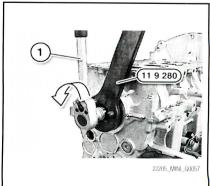
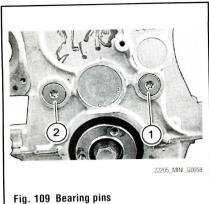
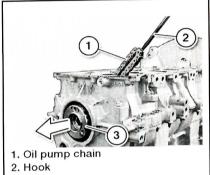


Fig. 108 Release central bolt





3. Hub

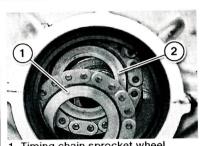
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Fig. 110 Remove hub and chain module with timing chain

- 3. Remove all spark plugs.
- 4. Remove vibration damper.
- Remove chain tensioner.
- 6. Remove both VANOS adjustment units.
 - Remove PTFE ring at front. 7.
 - 8. Remove belt tensioner.
- 9. Position crankshaft with special tool No. 11 9 590. Do not remove special tool No. 11 9 590 during repair work. Do not remove special tool No. 11 9 540.
- 10. Fit special tool No. 11 9 280 on hub for vibration damper with screws.

→You will need another person for gripping when releasing the central bolt.

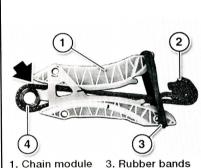
- 11. Release central bolt in direction of arrow.
 - 12. Release bearing pins.
 - 13. Remove hub toward front.
- 14. Remove chain module with timing chain.



- 1. Timing chain sprocket wheel
- 2. Oil pump sprocket wheel

22205 MINI_G0060

Fig. 111 Sprocket wheels



- 2. Timing chain
- 4. Sprocket wheel

22205 MINI_G0061

Fig. 112 Chain module assembly

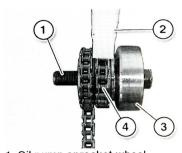
15. Using a hook, pull oil pump chain upwards.

To install:

- 16. Secure chain module with rubber bands to facilitate assembly.
- 17. Pull timing chain upwards until sprocket wheel rests against chain guide.
- 18. Install timing chain and sprocket wheel in this position.

→Always keep timing chain tensioned; it is possible for timing chain to jam on chain module.

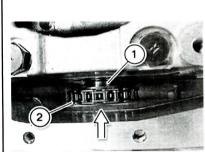
- 19. Attach oil pump sprocket wheel in direction of arrow to crankshaft.
- 20. Insert chain module with timing chain and secure.
 - 21. Attach crankshaft hub.
- 22. Screw in central bolt. Central bolt torque: 37 ft. lbs. (50 Nm), plus torque angle: 100°.



- 1. Oil pump sprocket wheel
- 2. Timing chain guide rail
- 3. Hub on crankshaft
- 4. Timing chain sprocket wheel

22205_MINI_G0062

Fig. 113 Install position of both sprocket wheels



- 1. Crankshaft
- 2. Oil pump sprocket wheel

22205 MINI G0063

Fig. 114 Attach oil pump sprocket wheel

- 23. Remove special tool No. 11 9 280 from hub.
- 24. Secure central bolt with special tool No. 00 9 120.
 - 25. Install VANOS adjustment units.
- 26. Install sprocket wheel for exhaust camshaft.
 - 27. Crank engine twice.
 - 28. Check timing.
 - 29. Install PTFE ring.
 - 30. Assemble engine.

VALVE LASH

ADJUSTMENT

All engines are equipped with hydraulic valve lash adjusters. This design does not permit adjustments nor are adjustments possible.

ENGINE PERFORMANCE & EMISSION CONTROL

CAMSHAFT POSITION (CMP) SENSOR

LOCATION

See Figure 115.

REMOVAL & INSTALLATION

- Switch off ignition
- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
- 4. For 2006 vehicles, remove the right engine support arm.
 - 5. Unlock and remove plug.
- 6. Release screw and camshaft sensor.

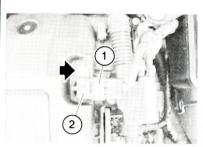


Fig. 115 Camshaft Position Sensor (Pulse Generator)

To install:

- 7. Replace sealing ring and coat with anti-seize agent.
- 8. The remainder of installation is the reverse of removal.
 - 9. Clear the fault memory.

CRANKSHAFT POSITION (CKP) SENSOR

LOCATION

See Figure 116.

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Switch off ignition.
- 3. Read out fault memory of DME control unit.
- 4. For 2006 vehicles, remove intake air manifold.
- → For purposes of clarity, the following work step is shown on the engine after it has been removed.

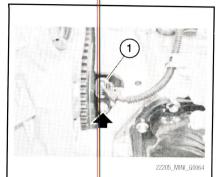


Fig. 116 Crankshart Position Sensor (Pulse Generator)

- Remove cover.
- Unlock plug and remove.
- 7. Release screw and remove crankshaft position sensor.
 - 8. Check stored fault messages.

To install:

- 9. Replace sealing ring. 10. The remainder of installation is the reverse of removal.
 - 11. Clear the fault memory.

ELECTRONIC CONTROL MODULE (ECM)

LOCATION

See Figure 117.

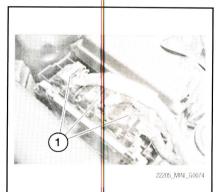


Fig. 117 DME location

REMOVAL & INSTALLATION

See Figures 117 through 119.

When replacing the DME/DDE control unit, observe the following: In each case read out the hardware/software status of the relevant control unit using the BMW diagnosis system. Comp y with the instructions of the DIS diagnosis system on the steps pertaining to coding and programming. On

vehicles with electronic vehicle immobilization, comply with the instructions of the BMW diagnosis system. Each control unit is programmed with certain basic values. which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.

If the DME control unit is without current for a long time (more than one hour), its adaptive system loses the stored values. When a cleared control unit is restarted or a new control unit is installed, the adaptive system must read in and store the input values of the associated engine as new basic values itself.

This procedure could lead to erratic idling and disturbed overrunning of the engine after starting. Depending on the engine it could require some time before all values are adapted to the engine condition.

Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit:

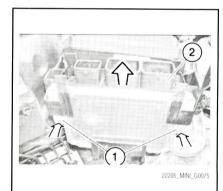
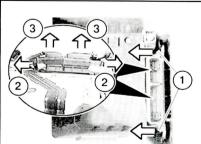


Fig. 118 Remove DME-2007-08 models



- 2. Direction to unlock plug connection
- 3. Direction to detach

22205 MINL G0076

Fig. 119 Remove DME-2006 models

If possible before exchanging control unit, run engine up to operating temperature. Exchange control units and run the vehicle at alternating engine speeds.

1. Before servicing the vehicle, refer to the precautions section.

** WARNING

Before beginning, always make sure to communicate with the fault memory with a BMW DIS (or equivalent OBD-II scan tool) for existing faults. It may be helpful to print out the results. Once the installation is complete, rerun the scan and correct the remaining faults.

** WARNING

Make sure that all electrical accessories are off and the ignition is switched off.

2. Disconnect the negative battery cable.

** WARNING

Take precautions against electrostatic damage.

- 3. Connect diagnosis system.
- 4. Read fault memory.
- 5. Check stored fault messages.
- 6. Rectify faults.
- 7. Clear fault memory.
- 8. For 2007-08 models, remove the

DME as follows:

- · Unlock and remove cover
- Unlock plug and remove
- Press locks in direction of arrow and remove control unit towards top (Locks are accessible through bores)
- 9. For 2006 models, remove the DME as follows:
 - Release clips and lift out DME control unit
 - Unlock plug connections outwards and detach in direction of arrow.
 - · Remove control unit

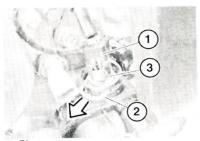
To install:

- 10. Installation is the reverse of removal.
- 11. Check stored fault messages.
- 12. Clear fault memory.

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

LOCATION

See Figure 120.



- 1. Plug
- 2. Lock
- 3. Coolant temperature sensor

22205 MINI G0068

Fig. 120 Coolant Temperature Sensor— 2007 models

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

See Figure 121.

** WARNING

There is a danger of scalding so only perform this task on an engine that has completely cooled down.

** CAUTION

Before beginning, always make sure to communicate with the fault memory with a BMW DIS (or equivalent OBD-II scan tool) for existing faults. It may be helpful to print out the results. Once the installation is complete, rerun the scan and correct the remaining faults.

** CAUTION

Make sure that all electrical accessories are off and the ignition is switched off.

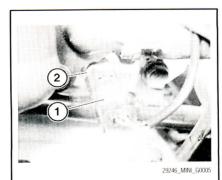


Fig. 121 The plug connection and the coolant temperature sensor

- 1. Remove the intake filter housing.
- 2. Drain the coolant down to below the height of the thermostat housing.
- 3. For the R50 (W10 Cooper) model only: Remove the battery housing.
- 4. Unlock the plug connection and remove it.
- 5. Remove the coolant temperature sensor.

To install:

- 6. Replace the coolant temperature sensor.
- 7. Install the plug connection and lock down the tab.
 - 8. Refill and vent the cooling system.
 - 9. Clear the fault memory.

2007-08 Cooper and Cooper S

See Figure 122.

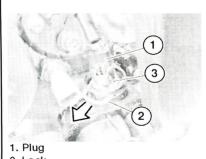
** WARNING

There is a danger of scalding so only perform this task on an engine that has completely cooled down.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.

→ Coolant can escape when temperature sensor is being replaced. Catch and dispose of coolant.

- 5. Release screw or clamps, as applicable.
- 6. Pull intake muffler towards top and detach clean air pipe.
- 7. Detach intake muffler from air filter housing and remove.
 - 8. Remove clean air pipe.
 - 9. Unlock and detach plugs.
 - 10. Unlock and disconnect line.



- 2. Lock
- 3. Coolant temperature sensor

22205_MINI_G0068

Fig. 122 Coolant temperature sensor

- 11. Carefully pull cable duct upwards slightly.
 - 12. Unlock plug and remove.
- 13. Detach lock and remove temperature sensor.

- 14. Replace sealing ring.
- 15. If necessary, add coolant.
- 16. Check cooling system for leaks.
- 17. Clear the fault memory.
- 18. The remainder of installation is the reverse of removal.

HEATED OXYGEN (HO2S) SENSOR

LOCATION

See Figure 123.

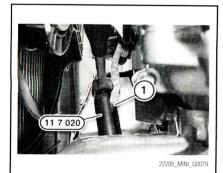


Fig. 123 Oxygen sensor

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

See Figures 124 and 125.

** CAUTION

Before beginning, always make sure to communicate with the fault memory with a BMW DIS (or equivalent OBD-II scan tool) for existing faults.

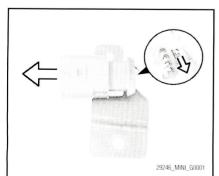


Fig. 124 The plug connectors and the retaining clips

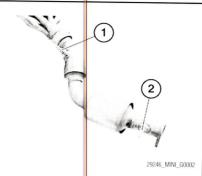


Fig. 125 The upstream oxygen sensor (1) and the downstream oxygen sensor (2)

It may be helpful to print out the results. Once the installation is complete, rerun the scan and correct the remaining faults.

** CAUTION

Make sure that all electrical accessories are off and the ignition is switched off.

- 1. Remove the heat shield.
- 2. Detach the connector from the retaining clips.
- 3. Remove the daygen sensors from their respective positions upstream and downstream.

To install:

- The threads of a new oxygen sensors are already coated with an anti-seize compound. If an oxygen sensor is to be used again, apply a thin and even coat of an anti-seize compound to the thread only.
- → Do not clean the oxygen sensor section which protruces into the exhaust line and ensure that it avoids all contact with any lubricants.
- → Observe cable routing of the oxygen sensor so it doesn't interfere with any other system or the exhaust pipes.
- 4. Replace the oxygen sensors in their respective positions upstream and downstream.
- 5. Attach the connector to the retaining clips.
 - 6. Replace the heat shield.
- 7. Check for any remaining faults. Rectify them and clear the fault memory.

2007-08 Cooper and Cooper S

See Figure 126.

1. Before servicing the vehicle, refer to the precautions section.



Fig. 126 Oxygen sensor

- 2. Read fault memory.
- →If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Service) to thread.
- The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.
- 3. Disconnect plug connection for lambda control sensor.
- 4. Release oxygen sensor with special tool No. 11 7 020.

To install:

- 5. Installation is reverse of removal.
- 6. Check function of DME.

INTAKE AIR TEMPERATURE (IAT) SENSOR

LOCATION

IAT sensor is located behind the front bumper.

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Remove front grill or bumper trim, as applicable.
- 3. Disconnect connector, and remove sensor.

To install:

4. Installation is the reverse of removal.

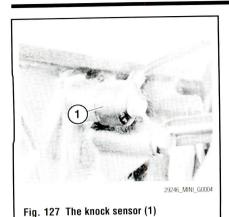
KNOCK SENSOR (KS)

LOCATION

The knock sensor is located under the intake manifold next to the starter motor.

REMOVAL & INSTALLATION

See Figure 127.



** CAUTION

Before beginning, always make sure to communicate with the fault memory with a BMW DIS (or equivalent OBD-II scan tool) for existing faults. It may be helpful to print out the results. Once the installation is complete, rerun the scan and correct the remaining faults.

** CAUTION

Make sure that all electrical accessories are off and the ignition is switched off.

- 1. For the R50 (W10 Cooper) only: Remove the intake air manifold.
- 2. For the R53 (W11 Cooper S) only: Remove the exhaust turbocharger.
- 3. Unlock and disconnect the knock sensor plug connection.
- 4. Unscrew the knock sensor screw and remove knock sensor.

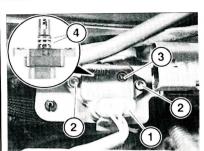
To install:

- 5. Clean the surface of knock sensors where they contact the engine block.
- 6. Observe the position of the knock sensor in relation to the engine block. It should be positioned at an angle of 20 degrees to the perpendicular of the engine block.
- 7. Replace the knock sensor and knock sensor screw.
- 8. Connect and lock the knock sensor plug connection.
 - 9. Clear the fault memory.

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

LOCATION

See Figure 128.



- 1. MAP sensor connector
- 2. MAP sensor retaining screws
- 3. MAP sensor
- 4. O-ring

22205 MINI G0070

Fig. 128 MAP Sensor-2006 Cooper S

REMOVAL & INSTALLATION

2006 Cooper Coupe and Cooper S Coupe

See Figure 129.

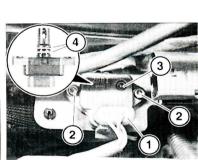
** CAUTION

Before beginning, always make sure to communicate with the fault memory with a BMW DIS (or equivalent OBD-II scan tool) for existing faults. It may be helpful to print out the results. Once the installation is complete, rerun the scan and correct the remaining faults.

- 1. Disconnect oxygen sensor connector.
- 2. Disconnect MAP sensor connector.
- 3. Remove MAP sensor retaining screws and remove sensor.
 - 4. Replace O-ring

To install:

5. Installation is the reverse of removal.



- 1. MAP sensor connector
- 2. MAP sensor retaining screws
- 3. MAP sensor
- 4. O-rina

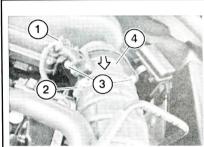
22205_MINI_G0070

Fig. 129 MAP Sensor

MASS AIR FLOW (MAF) **SENSOR**

LOCATION

See Figure 130.



- 1. Plug connection
- 2. Clamp
- 3. Screws

22205 MINI GODGO

Fig. 130 Mass Air Flow Sensor

REMOVAL & INSTALLATION

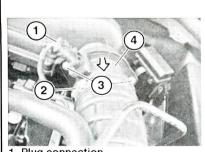
2007-08 Cooper and Cooper S

See Figure 131.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.
 - 5. Disconnect plug connection.
 - 6. Release clamp.
 - 7. Release screws.
- 8. Remove air-mass sensor in direction of arrow.

To install:

- 9. Installation is the reverse of removal.
- 10. Check stored fault messages.
- 11. Clear the fault memory.



- 1. Plug connection
- 2. Clamp
- 3. Screws

22205 MINI G0069

Fig. 131 Remove mass air flow sensor

FUEL

FUEL SYSTEM SERVICE PRECAUTIONS

Safety is the most important factor when performing not only fuel system maintenance but any type of maintenance. Failure to conduct maintenance and repairs in a safe manner may result in serious personal injury or death. Maintenance and testing of the vehicle's fuel system components can be accomplished safely and effectively by adhering to the following rules and guidelines.

- To avoid the possibility of fire and personal injury, always disconnect the negative battery cable unless the repair or test procedure requires that battery voltage be applied.
- Always relieve the fuel system pressure prior to disconnecting any fuel system component (injector, fuel rail, pressure regulator, etc.), fitting or fuel line connection. Exercise extreme caution whenever relieving fuel system pressure to avoid exposing skin, face and eyes to fuel spray. Please be advised that fuel under pressure may penetrate the skin or any part of the body that it contacts.
- Always place a shop towel or cloth around the fitting or connection prior to loosening to absorb any excess fuel due to spillage. Ensure that all fuel spillage (should it occur) is quickly removed from engine surfaces. Ensure that all fuel soaked cloths or towels are deposited into a suitable waste container.
- Always keep a dry chemical (Class B) fire extinguisher near the work area.
- Do not allow fuel spray or fuel vapors to come into contact with a spark or open flame.
- Always use a back-up wrench when loosening and tightening fuel line connection fittings. This will prevent unnecessary stress and torsion to fuel line piping.
- Always replace worn fuel fitting Orings with new Do not substitute fuel hose or equivalent where fuel pipe is installed.

Before servicing the vehicle, make sure to also refer to the precautions in the beginning of this section as well.

RELIEVING FUEL SYSTEM PRESSURE

See Figure 132.

- 1. Install special tool, 13-5-220.
- 2. Fit a suitable length of hose onto the special tool and route the hose into a fuel container.

GASOLINE FUEL INJECTION SYSTEM

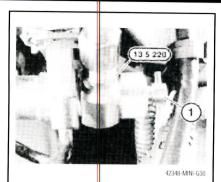


Fig. 132 Using special tool to relieve fuel rail pressure

- 3. Screw in check valve (1) of the special tool to release the fuel pressure from the injector rail.
- 4. Hold an absorbent cloth around the special tool and remove the hose and tool.

** WARNING

Other parts of the fuel system may have some residual pressure. Always open fittings slowly and be prepared to catch any fuel.

FUEL FILTER

REMOVAL & INSTALLATION

- Before servicing the vehicle, refer to the precautions in the beginning of this section.
- 2. Disconnect the negative battery cable.
 - 3. Remove the rear seat.
 - 4. Remove the access cover.
 - 5. Disconnect the fuel line.
 - Remove the locking ring.
 - 7. Remove the fuel filter.
- 8. Installation is the reverse of the removal procedure.

FUEL INJECTORS

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions in the beginning of this section.
- Disconnect the negative battery cable.
 - 3. Relieve fuel system pressure.
 - 4. Disconnect the fuel line.
- 5. Remove the fuel rail with injectors attached.
- 6. Installation is the reverse of the removal procedure.

FUEL PUMP

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Drain the fuel tank.
 - 3. Remove or disconnect the following:
 - Negative battery cable
 - Rear seat
 - Fuel pump access plate (under trim panel)
 - Electrical connector
- 4. Unscrew the outer ring with special tool 16–1–020.
- Lift the cap and detach the fuel line and electrical connector from the fuel level sensor.
- 6. Remove the fuel level sensor and fuel pump from the tank.

To install:

→Always use a new seal or gasket when installing the fuel pump or fuel level gauge sending unit assembly.

- 7. Install or connect the following:
 - Fuel pump into the fuel tank taking care not to bend or damage the fuel sending unit assembly
- New seal and torque the sealing ring, using tool No. 16-1-020, to 26 ft. lbs. (35 Nm).
- Fuel gauge level sending unit electrical connector
- Metal cover
- · Rear seat bench
- Negative battery cable
- 8. Refill fuel tank.
- 9. Start the vehicle and check for leaks, repair if necessary.

FUEL TANK

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions in the beginning of this section.
 - 2. Disconnect the negative battery cable.
 - 3. Drain the fuel tank.
 - 4. Remove the muffler.
 - 5. Remove the exhaust heat shield.
- 6. Remove the rear storage compartment bracket.
 - 7. Remove the parking brake cables.
 - 8. Remove the rear seat.
 - 9. Remove trim panels.
 - 10. Remove the left wheel arch trim.
- 11. Disconnect the fuel level sensor and wiring harness.

- 12. Remove the fuel tank filler hose.
- 13. Remove the vent hose from the fuel filler pipe.
- 14. Support the fuel tank and remove the mounting bolts.
- 15. Lower the tank and disconnect the right vent line.
 - 16. Remove the fuel tank.

- 17. Raise the fuel tank into position and attach the right vent line.
- 18. Install the mounting bolts and tighten them to 22–28 Nm (16–20 ft. lbs.).
- 19. Install the vent hose to the fuel filler pipe.
 - 20. Install the fuel tank filler hose.
- 21. Connect the fuel level sensor and wiring harness.
 - 22. Install the wheel arch trim.
 - 23. Install the trim panels.
 - 24. Install the rear seat.
- 25. Install and adjust the parking brake cables.
- 26. Install the rear storage compartment bracket.
 - 27. Install the exhaust heat shield.
 - 28. Install the muffler.
 - 29. Add fuel.
 - 30. Connect the negative battery cable.

IDLE SPEED

ADJUSTMENT

Idle speed is maintained by the Power-train Control Module (PCM). No adjustment is necessary or possible.

THROTTLE BODY

REMOVAL & INSTALLATION

2006 Cooper Coupe

See Figure 133.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.
 - 5. Remove intake filter housing.
 - 6. Remove intake fitting.
- 7. Unlock line of tank venting valve on throttle valve assembly and disconnect.
 - 8. Unlock plug and remove.
 - 9. Loosen screws.
 - 10. Remove throttle valve assembly.

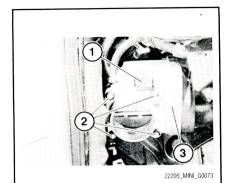


Fig. 133 Throttle assembly—2006 Cooper

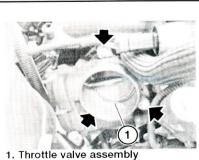
To install:

- 11. Replace sealing ring.
- 12. The remainder of installation is the reverse of removal.
- A faulty throttle valve causes the adaptation values stored in the DME control unit to be modified. These adaptation values must be reset after the throttle valve has been replaced.
- →Replacement only: Delete adaptation values and reset. Connect diagnosis system: Diagnosis, model, DME engine, control unit function, DME 200, component activation, reset adaptation values, electronic throttle.
 - 13. Clear the fault memory.

2007-08 Cooper

See Figure 134.

1. Before servicing the vehicle, refer to the precautions section.



22205_MINI_G0071

Fig. 134 Throttle assembly—2007–08 Cooper

- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.
 - 5. Unfasten screws.
- 6. Carefully feed out throttle valve assembly towards top until plug for cable connection is accessible.
 - 7. Unlock connector and remove.
 - 8. Remove throttle valve assembly.

To install:

- 9. Replace sealing ring.
- 10. The remainder of installation is the reverse of removal.
 - 11. Clear the fault memory.

2007-08 Cooper S

See Figure 135.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.
 - 5. Remove sound generator.
- 6. Release clamps and detach air intake hose.
- 7. Release screws and carefully feed out throttle valve assembly towards top until plug is accessible.
 - 8. Unlock plug and disconnect.
 - 9. Detach cable ties.
 - 10. Remove throttle valve assembly.

- 11. Replace sealing ring.
- 12. The remainder of installation is the reverse of removal.
 - 13. Clear the fault memory.

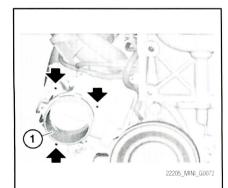


Fig. 135 Throttle assembly—2007–08 Cooper S

HEATING & AIR CONDITIONING SYSTEM

BLOWER MOTOR

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Disconnect the negative battery
 - 3. Drain the cooling system.
- 4. Discharge and recover the A/C refrigerant.
- 5. Remove the instrument panel by removing or disconnecting the following:
 - Battery box
 - · Intake filter housing
 - · Heater hoses
 - A/C pipe from firewall fittings (plug openings)
 - · Heater locating stud nut
 - · Steering column from steering gear
 - Steering column from rubber bellows
 - · Left and right A-pillar trim
 - Radio
 - Cover from beneath center controls
 - · Left and right kick panels
 - Connector behind left kick panel
 - Upper connector from blower control
 - Instrument panel end covers
 - Bolts behind end covers
 - Lower section of steering column trim panel
 - Electrical harness from instrument panel trim
 - Connectors on steering column
 - · Heater connector
 - Lower bolts on instrument panel support (next to steering column lower end)
 - Instrument panel
- 6. Disconnect the fan motor wiring harness.
 - 7. Remove the fan motor.

To install:

- 8. Install the fan motor and connect the wiring harness.
- 9. Install the instrument panel in reverse of the removal procedure.
 - 10. Refill the cooling system.
 - 11. Reconnect the negative battery cable.
- 12. Evacuate and recharge the A/C system.
- 13. Check the coplant level after starting the engine and running for several minutes.

HEATER CORE

REMOVAL & INSTALLATION

See Figure 136.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Disconnect the negative battery cable.
 - 3. Drain the cooling system.
- 4. Discharge and recover the A/C refrigerant.
- Remove the instrument panel by removing or disconnecting the following:
 - Battery box
 - Intake filter housing
 - Heater hoses
 - A/C pipe from firewall fittings (plug openings)
 - Heater locating stud nut
 - Steering column from steering gear
 - Steering column from rubber bellows
 - Left and right A-pillar trim
 - Radio
 - Cover from beneath center controls
 - Left and right kick panels
 - Connector behind left kick panel
 - Upper connector from blower control
 - Instrument panel end covers
 - Bolts behind end covers
 - Lower section of steering column trim panel

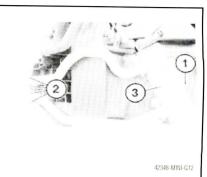


Fig. 136 Removing heater pipes from heater housing

- Electrical harness from instrument panel trim
- Connectors on steering column
- · Heater connector
- Lower bolts on instrument panel support (next to steering column lower end)
- Instrument panel
- 6. Remove the cover panel from the heater core.
- Remove the screw and pipes from the connector on the side of the heater housing.
 - 8. Remove the heater core.

To install:

- 9. Install the heater core into the housing.
- 10. Connect the heater pipes on the side of the housing.
 - 11. Install the heater housing side cover.
- 12. Install the instrument panel in reverse of the removal procedure.
 - 13. Refill the cooling system.
 - 14. Reconnect the negative battery cable.
- 15. Evacuate and recharge the A/C
- 16. Check the coolant level after starting the engine and running for several minutes.

STEERING

POWER STEERING GEAR

REMOVAL & INSTALLATION

Hydraulic Power Steering

See Figure 137.

1. Before servicing the vehicle, refer to the precautions section.

** CAUTION

It is essential to maintain cleanliness of components, especially when

removing hoses or otherwise opening the hydraulic system. Always plug all openings to seal against debris getting into the system.

- 2. Remove the front wheels.
- 3. Apply a reference mark on the steering tie rod with paint, for reassembly reference.
- 4. Remove the nots on the left and right tie rod ends and separate the tie rod ends from the steering knuckle.
- 5. Release the nuts (1) at the bottom of the stabilizer bar.

- 6. Drain the steering fluid from the reservoir.
- 7. Remove the nut on the clamp at the lower end of the steering column (near the firewall).
- 8. Detach the high pressure line and low pressure line from the steering gear (banjo bolts). Plug the openings.
- 9. Remove the heat shield from the steering gear.
- 10. Detach the line bracket from the ends of the steering gear housing, then remove

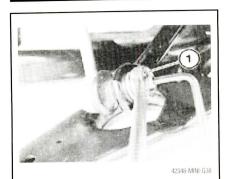


Fig. 137 Releasing nuts on bottom of the stabilizer bar

the 4 bolts holding the steering gear to the chassis.

11. Remove the steering gear.

To install:

- 12. Position the steering gear to the chassis mountings. Torque the retaining bolts to 41 ft. lbs. (56 Nm).
 - 13. Install or connect the following:
 - · Line bracket on end of steering gear
 - Heat shield; torque bolts to 14 ft. lbs. (19 Nm)
 - Power steering pipes to steering gear; torque high pressure pipe bolt to 25 ft. lbs. (34 Nm) and low pressure pipe bolt to 30 ft. lbs. (40 Nm)
 - Pinch bolt at steering gear to steering column; torque new nut to 16 ft. lbs. (22Nm)
 - New self-locking nuts of bottom of stabilizer bar; torque to 41 ft. lbs. (56 Nm)
 - Tie rod end ball joint nut to steering knuckle; torque new nut to 38 ft. lbs. (52 Nm)
- 14. Reset tie rod to steering gear by screwing connection in until paint marks align (this is an initial setting).
 - 15. Bleed the power steering system.
 - 16. Check and adjust alignment.

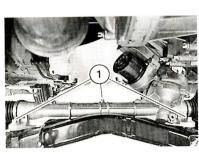
Electronic Power Steering

See Figure 138.

1. Before servicing the vehicle, refer to the precautions section.

** WARNING

Steering gear: Check connection of steering gear for corrosion,



22205_MINI_G007

Fig. 138 Electronic power steering

clean contacts if necessary. The steering gear must be replaced if the corrosion is too far advanced.

** WARNING

Connecting cable: In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting cable. If the insulation reveals any noticeable/striking features, it will be necessary to replace the part. Otherwise it will be sufficient to replace the contacts or plug housing.

- 2. Disconnect the negative battery cable.
- 3. Remove both tie rod ends from swivel bearing.
- 4. Replacement: Remove both tie rod ends from steering gear.
 - 5. Lower front axle support.
 - 6. Release screws.

** WARNING

Do not allow the control head of the steering gear to strike other components. This may result in damage to the steering gear.

First swing steering gear in direction of travel to right and then remove towards front.

To install:

→For replacement: On cars with 18" tires, it will be necessary to replace steering stop limiters.

→ Deformation elements must point to steering gear.

- 8. The remainder of installation is the reverse of removal.
 - 9. After installation, check alignment.
- 10. For replacement: Carry out programming/coding.
- 11. For models with Dynamic Stability Control (DSC): Carry out steering angle sensor adjustment.
- →Only cars with DSC are fitted with a steering angle sensor (integrated in the steering column switch cluster).

POWER STEERING PUMP

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions in the beginning of this section.
- 2. Disconnect the negative battery cable.
- 3. Remove the power steering cooling fan.
 - 4. Drain the power steering fluid.
- 5. Disconnect the wiring harness connectors.
- 6. Disconnect the pressure and return lines.
- 7. Remove the power steering pump and bracket.
- 8. Installation is the reverse of the removal procedure.
- 9. Bleed the power steering hydraulic system.

BLEEDING

** CAUTION

Thoroughly clean the reservoir and parts in immediate working area before removing the oil reservoir cap. No dirt must enter the system.

- 1. Check power steering fluid level and top up as needed.
- 2. Start the engine and turn the steering wheel 2 times to the left and right.
- 3. Stop the engine and check the fluid level. Adjust if needed.
- 4. Repeat this process if the fluid level went down significantly or if presence of bubbles is still noted.

SUSPENSION

COIL SPRING

REMOVAL & INSTALLATION

** CAUTION

This procedure calls for the spring to be compressed. A compressed spring has high potential energy and if released suddenly can cause severe damage and personal injury.

- →Springs with identical color code must be used in pairs (color code is on the end of the spring coil).
- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Remove the strut from the vehicle and mount in a vise using a strut holder. This will prevent damage to the strut tube
- 3. Using a proper spring compressor, 31-3-341 with 31-3-355, compress the spring until the lock pins on the coil spring holding tools are heard and felt to lock in place.
- 4. Only tighten the coil springs until the stress on the thrust bearing is relieved
- 5. Remove the retaining nut and the coil spring and strut assembly.
- 6. Slowly release the compression of the spring.

To install:

- 7. Check the condition of the spring pad and replace it, if necessary,
- 8. Be sure the spring pad fits over the tongue on the lower spring seat.
- 9. Check the protective sleeve on top of the upper spring seat. During installation, make sure the tabs of the sleeve fit correctly
- 10. Be sure spring seats are fit from the chamfered side of the special tools and that the lock pins are heard and felt to lock in position.
 - 11. Recheck the fit of the spring seats.
- 12. There must be 3 spring coils between the spring retainers when properly positioned. The end of the spring must be located under end of spring retainer. Coil spring must lie completely in the recess when tensioned in the spring retainer.
- 13. Insert the spring strut into the coil spring. Mount the protective sleeve, auxiliary spring, and upper spring seat.
- 14. Screw the self-locking nut onto the piston rod.
- 15. Release the coil spring until it is fully resting on the lower spring plate.

- ➡The end of the coil spring must be aligned correctly at the rubber seal of the spring seat.
- 16. Fully tighten the new self-locking nut to 47 ft. lbs. (64 Nm).
- 17. Fully release the coil spring and remove the spring compressor tool.
 - 18. Install the strut assembly.

LOWER BALL JOINT

REMOVAL & INSTALLATION

→Vehicle uses ball joints on lower control arm and on tie rod ends. Lower ball joints can be separated from steering knuckle after raising front end of vehicle. Complete removal of lower control arm requires removal of subframe.

LOWER CONTROL ARM

REMOVAL & INSTALLATION

See Subframe.

MACPHERSON STRUT

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove or disconnect the following:
 - Tire and wheel assembly
 - ABS cable and brake hose from retainers on strut bracket
 - Brake caliper from disc and tie out
 - Nut from stapilizer end.
 - Tie rod end ball joint from steering knuckle
 - Transverse Ink ball joint from steering knuckle
- 3. With steering knuckle supported, remove the clamping screw from the lower end of the McPherson strut and detach the steering knuckle from the strut.
- 4. Remove the 3 upper strut retaining nuts (on top of strut tower).
 - 5. Remove the strut assembly.

To install:

- 6. Install or connect the following:

 - Strut assembly3 new nuts on strut tower; torque to 25 ft. lbs. (34 Nm)
- 7. Fit the support bracket into the gap and press the steering knuckle upward until the bolt fits in the bracket hole (lower end of strut). Torque the bolt to 60 ft. lbs. (81 Nm).
 - 8. Remove the steering knuckle support.

FRONT SUSPENSION

- 9. Install or connect the following:
 - Transverse link to steering knuckle: torque new self-locking nut to 41 ft. lbs. (56 Nm)
 - · Tie rod end to steering knuckle; torque new self-locking nut to 38 ft. lbs. (52 Nm)
 - New self-locking nut on stabilizer end; torque to 41 ft. lbs. (56 Nm)
 - Brake caliper; torque quide pin bolts to 23 ft. lbs. (31 Nm)
 - ABS cable and brake hose to strut retainers
 - Front wheel

STABILIZER BAR

REMOVAL & INSTALLATION

See Subframe.

STEERING KNUCKLE

REMOVAL & INSTALLATION

See Wheel Bearings.

SUBFRAME (AXLE CARRIER)

REMOVAL & INSTALLATION

See Figure 139.

- 1. Before servicing the vehicle, refer to the precautions section.
 - Remove or disconnect the following:
 - Front wheels
 - Front bumper and bumper carrier
 - Impact tube
 - · Bulkhead nuts and clamp nut holding reservoir tank to bulkhead
 - Tie rod ends from steering knuckle
 - · Left and right stabilizer rods from stabilizer bar
 - · Lower control arm ball joints from steering knuckle



Fig. 139 Illustrating how the power steering reservoir should be held after the subframe is removed

- Power steering pump electrical plug
- Steering column shaft from steering gear
- · Lower engine stabilizer bracket
- 3. Position a jack at the jacking point on chassis subframe.
 - 4. Remove or disconnect the following:
 - Center bolts for left and right side of subframe at vehicle body
 - Bolts holding left and right retaining bushing housing on body
 - All bolts from rear end of subframe to body
- 5. Lower the subframe and power steering reservoir through the engine compartment
- 6. Remove the cable assembly between the subframe and steering gear (if equipped).
- 7. Use a 0.16 inch (4mm) rod to hold the power steering reservoir vertically, as shown.
 - Remove or disconnect the following:
 - Stabilizer bar
 - Lower control arms from subframe
 - Retaining clips for lower covering from subframe
 - · Steering gear heat shield
 - Power steering line and power steering gear from subframe
 - Power steering pump from subframe
 - · Stone guard

- 9. Install or connect the following:
 - New retaining clips for ABS wiring harness to subframe
 - · Stone guard
 - Power steering pump to subframe; torque mounting bracket bolts to 14 ft. lbs. (19 Nm)
 - Steering gear to subframe; torque mounting bolts to 41 ft. lbs. (56 Nm)

- · Power steering line bracket
- · Steering gear heat shield
- Bottom covering to subframe clips
- Lower control arms to subframe; torque mounting bolts 74 ft. lbs. (100 Nm)
- Stabilizer bar to subframe; torque mounting bolts to 122 ft. lbs. (165 Nm)
- 10. Position the subframe and power steering reservoir into position. Install the rear subframe bolts. Torque bolts to 71 ft. lbs. (100 Nm).
- 11. Install, but do not tighten, bolts holding left and right retaining bushing housing to body.
- 12. Install the center bolts for the front left and right side subframe mountings to body. Torque bolts to 74 ft. lbs. (100 Nm).
- 13. Fully tighten the left and right bushing housing bolt to 44 ft. lbs. (59 Nm), plus an additional 90 degrees, then an additional 15 degrees.
- 14. Remove the jack from the subframe jacking point.
 - 15. Install or connect the following:
 - Lower engine stabilizer; torque bolts to 74 ft. lbs. (100 Nm)
 - Steering gear to lower end of steering column; tighten new pinch bolt nut to 16 ft. lbs. (22 Nm)
 - High voltage connector to power steering pump
 - Lower control arm ball joints to steering knuckle; torque new nuts to 41 ft. lbs. (56 Nm)
 - Left and right stabilizer rods to stabilizer bar; torque new nuts to 41 ft. lbs. (56 Nm)
 - Tie rod end ball joints to steering knuckle; torque new nuts to 38 ft. lbs. (52 Nm)

- Power steering reservoir clamp bolt and mounting bolts to bulkhead; torque nuts to 14 ft. lbs. (19 Nm)
- Impact tube
- · Bumper carrier and bumper
- Front wheels
- 16. Check and adjust wheel alignment.

WHEEL BEARINGS

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove or disconnect the following:
 - · Front wheels
 - · Hub nut
 - · Brake caliper
 - Rotor
 - · ABS sensor
 - Wheel hub from steering knuckle and driveshaft
 - · Wheel bearings

To install:

- 3. Install or connect the following:
 - Wheel bearing into hub
- Wheel hub to steering knuckle and driveshaft; torque bolts to 41 ft. lbs. (56 Nm)
- ABS sensor; torque to 6 ft. lbs. (8 Nm)
- Brake rotor and caliper
- New flanged hub nut; torque to 134 ft. lbs. (182 Nm)
- 4. Stake flanged nut into groove of thread on driveshaft.

ADJUSTMENT

Wheel bearings cannot be adjusted and must be replaced as a unit and never be reused once removed.

SUSPENSION

COIL SPRING

REMOVAL & INSTALLATION

** CAUTION

This procedure calls for the spring to be compressed. A compressed spring has high potential energy and if released suddenly can cause severe damage and personal injury.

- → Springs with identical color code must be used in pairs (color code is on the end of the spring coil).
- 1. Before servicing the vehicle, refer to the precautions section.

- 2. Remove the strut from the vehicle and mount in a vise using a strut holder. This will prevent damage to the strut tube.
- 3. Using a proper spring compressor, 31–3–341 with 31–3–355, compress the spring until the lock pins on the coil spring holding tools are heard and felt to lock in place.
- 4. Only tighten the coil springs until the stress on the thrust bearing is relieved.
- 5. Remove the retaining nut and the coil spring and strut assembly.
- 6. Slowly release the compression of the spring.

REAR SUSPENSION

- 7. Check the condition of the spring pad and replace it, if necessary.
- 8. Be sure the spring pad fits over the tongue on the lower spring seat.
- 9. Check the protective sleeve on top of the upper spring seat. During installation, make sure the tabs of the sleeve fit correctly over the trim.
- 10. Be sure spring seats are fit from the chamfered side of the special tools and that the lock pins are heard and felt to lock in position.
 - 11. Recheck the fit of the spring seats.
- 12. There must be 3 spring coils between the spring retainers when properly

positioned. The end of the spring must be located under end of spring retainer. Coil spring must lie completely in the recess when tensioned in the spring retainer.

13. Insert the spring strut into the coil spring. Mount the protective sleeve, auxiliary spring, and upper spring seat.

14. Screw the self-locking nut onto the piston rod.

15. Release the coil spring until it is fully resting on the lower spring plate.

The end of the coil spring must be aligned correctly at the rubber seal of the spring seat.

16. Fully tighten the new self-locking nut to 47 ft. lbs. (64 Nm).

17. Fully release the coil spring and remove the spring compressor tool.

18. Install the strut assembly.

LOWER CONTROL ARM

REMOVAL & INSTALLATION

See Figure 140.

1. Before servicing the vehicle, refer to the precautions section.

2. Remove rear wheel. If necessary, remove spare wheel.

3. Remove underbody paneling.

4. Only on right side: Remove complete exhaust system and heat shield.

→To obtain balanced vehicle handling, it is recommended that the control arms be replaced in pairs.

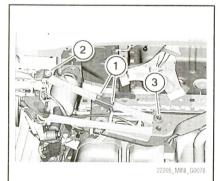


Fig. 140 Upper and lower control arms

5. Mark position of eccentric adjustment washer to trailing arm to simplify subsequent adjustment of rear axle.

6. Release screw.

7. Loosen nut.

8. Remove screw and then remove control arm.

To install:

9. Installation is the reverse of removal. Tighten the bolt and the self-locking nuts to 74 ft. lbs. (100 Nm)

10. Check alignment.

STRUT

REMOVAL & INSTALLATION

1. Before servicing the vehicle, refer to the precautions sect on.

2. Place a jack or other support to relieve the load on the trailing arm.

3. Remove the lower strut mounting bolt.

4. Release the ABS sensor and brake hose from the retainers on the strut.

5. Remove the 2 upper retaining bolts for the strut.

6. Support the strut and remove it from the vehicle.

To install:

7. Position the strut and install the upper mounting bolts. Torque the bolts to 41 ft. lbs. (56 Nm).

8. Be sure that the rubber grommets for the ABS sensor and prake hose are correctly installed.

9. Install the ABS sensor and brake hose to the strut retainers.

10. Install the lower strut bolt and torque to 103 ft. lbs. (140 Nm).

11. Remove the jack from under the trailing arm.

UPPER CONTROL ARM

REMOVAL & INSTALLATION

See Figure 140.

1. Before servicing the vehicle, refer to the precautions section.

2. Remove rear wheel. If necessary, remove spare wheel.

3. Remove underbody paneling.

4. Only on right side: Remove heat shield (on COOPER S on left and right).

→To obtain balanced vehicle handling, it is recommended that the control arms be replaced in pairs.

5. Release screw.

6. Release nut and remove screw.

7. Unscrew nut.

8. Remove screw and then remove control arm.

To install:

9. Installation is the reverse of removal. Tighten the self-locking nuts to 74 ft. lbs. (100 Nm).

10. Check alignment.

WHEEL BEARINGS

REMOVAL & INSTALLATION

1. Before servicing the vehicle, refer to the precautions section.

2. Remove or disconnect the following:

· Wheel assembly

 Brake caliper (tie to body without strain on hose)

ABS sensor from trailing arm

Stabilizer bar, if equipped

Brake rotor

Wheel hub from trailing arm

Wheel bearing from hub

To install:

3. Install or connect the following:

Wheel bearing

 Wheel hub to trailing arm; torque bolts to 41 ft. lbs. (56 Nm)

 Brake rotor; torque bolts to 20 ft. lbs. (27 Nm)

 Stabilizer bar, if equipped; torque new nuts to 41 ft. lbs. (56 Nm)

ABS sensor

 Brake caliper; torque guide pin bolts to 48 ft. lbs. (65 Nm)

· Wheel assembly

ADJUSTMENT

Wheel bearings cannot be adjusted and must be replaced as a unit and never be reused once removed.

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Removal & Installation	20-39
Stabilizer Bar	
Removal & Installation	20-41
Steering Knuckle	
Removal & Installation	20-40
Wheel Hub & Bearing	
(sealed unit)	20-41
Removal & Installation	
EAR SUSPENSION	
Lower Control Arm	20-42
Removal & Installation	20-42
MacPherson Struts	
Removal & Installation	
Stabilizer Bar	
Removal & Installation	
Upper Control Arm	
Removal & Installation	20-43
Wheel Hub & Bearing	
(sealed unit)	
Removal & Installation	20 44

SPECIFICATIONS AND MAINTENANCE CHARTS

ENGINE AND VEHICLE IDENTIFICATION

		Model Year						
Code ①	Liters (cc)	Cu. In.	Cyl.	Fuel Sys.	Engine Type	Eng. Mfg.	Code ②	Year
N12	1.6 (1598)	97.5	4	NS	DOHC	BMW	9	2009
N14	1.6 (1598)	97.5	4	NS	DOHC	BMW	Α	2010

NS: Not Specified

DOHC: Dual Overhead Camshaft

① 8th position of VIN

2 10th position of VIN

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GENERAL ENGINE SPECIFICATIONS

			Engine	Net	Net	Bore x	Com-	Oil
			Displacement	Horsepower	Torque @ rpm	Stroke	pression	Pressure
Year	Model	Series	Liters (VIN)	@ rpm	(ft. lbs.)	(in.)	Ratio	@ rpm
2009	Cooper	R56	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper Clubman	R55	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper Clubman JCW	R55	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper Convertible	R57	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper S	R56	1.6 (N 14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper S JCW	R56	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper S Clubman	R55	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper S Convertible	R57	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper S Convertible JCW	R57	1.6 (N 14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
2010	Cooper	R56	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper Clubman	R55	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper Clubman JCW	R55	1.6 (N12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper Convertible	R57	1.6 (N 12)	118@6000	114@4250	3.03x3.38	11.0:1	25-80@3000
	Cooper S	R56	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper S JCW	R56	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper S Clubman	R55	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper S Convertible	R57	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000
	Cooper S Convertible JCW	R57	1.6 (N14)	172@5500	177@1600	2.87x3.38	10.5:1	25-80@3000

JCW: John Cooper Works

ENGINE	TUNE-U	2 SPECIF	ICATIONS

				0. 20. 10.11.0110					
			Engine	Spark Plug	Ignition	Fuel	ldle	Va	lve
			Displacement	Gap	Timing	Pump	Speed	Clea	rance
Year	Model	Series	Liters (VIN)	(in.)	(deg.)	(psi)	(rpm)	ln.	Ex.
2009	Cooper	R56	1.6 (N12)	NA	1	NA	2	HYD	HYD
	Cooper Clubman	R55	1.6 (N12)	NA	1	NA	2	HYD	HYD
	Cooper Clubman JCW	R55	1.6 (N12)	NA	1	NA	2	HYD	HYD
	Cooper Convertible	R57	1.6 (N12)	NA	1	NA	2	HYD	HYD
	Cooper S	R56	1.6 (N14)	NA	1)	NA	2	HYD	HYD
	Cooper S JCW	R56	1.6 (N14)	NA	1)	NA	2	HYD	HYD
	Cooper S Clubman	R55	1.6 (N14)	NA	1)	NA	2	HYD	HYD
	Cooper S Convertible	R57	1.6 (N14)	NA	1	NA	2	HYD	HYD
	Cooper S Convertible JCW	R57	1.6 (N14)	NA	1	NA	2	HYD	HYD
2010	Cooper	R56	1.6 (N12)	NA	1	NA	2	HYD	HYD
	Cooper Clubman	R55	1.6 (N12)	NA	1	NA	2	HYD	HYD
	Cooper Clubman JCW	R55	1.6 (N12)	NA	1	NA	2	HYD	HYD
	Cooper Convertible	R57	1.6 (N12)	NA	1	NA	2	HYD	HYD
	Cooper S	R56	1.6 (N14)	NA	1	NA	2	HYD	HYD
	Cooper S JCW	R56	1.6 (N14)	NA	1	NA	2	HYD	HYD
	Cooper S Clubman	R55	1.6 (N14)	NA	1)	NA	2	HYD	HYD
	Cooper S Convertible	R57	1.6 (N14)	NA	1)	NA	2	HYD	HYD
	Cooper S Convertible JCW	R57	1.6 (N14)	NA	1	NA	2	HYD	HYD

NOTE: The Vehicle Emission Control Information label often reflects specification changes made during production. The label figures must be used if they differ from those in this chart.

NA: Not available

HYD: Hydraulic

JCW: John Cooper Works

① Ignition timing is regulated by the Electronic Control Module (ECM), and cannot be adjusted.

② Idle speed is controled by the Electronic Control Module (ECM), and cannot be adjusted.

CAPACITIES

			CAFACI	IILO				
				Engine				
			Engine	Oil with	Automatic	Manual	Fuel	Cooling
			Displacement	Filter	Transaxle	Transaxle	Tank	System
Year	Model	Series	Liters (VIN)	(qts.)	(qts.)	(qts.)	(gal.)	(qts.)
2009	Cooper	R56	1.6 (N12)	4.5	5.3	1.8	13.2	5.5
	Cooper Clubman	R55	1.6 (N12)	4.5	5.3	1.8	13.2	5.5
	Cooper Clubman JCW	R55	1.6 (N12)	4.5	5.3	1.8	13.2	5.5
	Cooper Convertible	R57	1.6 (N12)	4.5	5.3	1.8	13.2	5.5
	Cooper S	R56	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
	Cooper S JCW	R56	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
	Cooper S Clubman	R55	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
	Cooper S Convertible	R57	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
	Cooper S Convertible JCW	R57	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
2010	Cooper	R56	1.6 (N12)	4.5	5.3	1.8	13.2	5.5
	Cooper Clubman	R55	1.6 (N12)	4.5	5.3	1.8	13.2	5.5
	Cooper Clubman JCW	R55	1.6 (N12)	4.5	5.3	1.8	13.2	5.5
	Cooper Convertible	R57	1.6 (N12)	4.5	5.3	1.8	13.2	5.5
	Cooper S	R56	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
	Cooper S JCW	R56	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
	Cooper S Clubman	R55	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
	Cooper S Convertible	R57	1.6 (N14)	4.5	5.3	1.6	13.2	5.5
	Cooper S Convertible JCW	R57	1.6 (N14)	4.5	5.3	1.6	13.2	5.5

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FLUID SPECIFICATIONS

					· LUID	OI LOII IOA	1110111					
			Engine							Power	Brake	
	Body		Displ.	Engine	Man.	Auto.	Driv	e Axle	Transfer	Steering	Master	Cooling
Year	Type	Model	Liters	Oil	Trans.	Trans.	Front	Rear	Case	Fluid	Cylinder	System
2009	Cooper	R56	1.6 (N12)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper Clubman	R55	1.6 (N12)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper Clubman JCW	R55	1.6 (N12)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper Convertible	R57	1.6 (N12)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S	R56	1.6 (N14)	5W-30	GLS	①	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S JCW	R56	1.6 (N14)	5W-30	GLS	①	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S Clubman	R55	1.6 (N14)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S Convertible	R57	1.6 (N14)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S Convertible JCW	R57	1.6 (N14)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
2010	Cooper	R56	1.6 (N12)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper Clubman	R55	1.6 (N12)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper Clubman JCW	R55	1.6 (N12)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper Convertible	R57	1.6 (N12)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S	R56	1.6 (N14)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S JCW	R56	1.6 (N14)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S Clubman	R55	1.6 (N14)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S Convertible	R57	1.6 (N14)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant
	Cooper S Convertible JCW	R57	1.6 (N14)	5W-30	GLS	1	NA	NA	NA	Dexron III	DOT 4	Long Life Coolant

NA: Not applicable

DOT: Department Of Transpotation

① GACVT16Z: VTF or MINI Part no. 83 22 0 136 376 GA6F21WA: TIV or Synthetic Universal Automatic Tranmssion Fluid

VALVE SPECIFICATIONS

				VALVEOI	L.O. 107	1110110			
					Spring	Stem-to	-Guide	St	tem
	Engine	Seat	Face	Spring Test	nstalled	Clear	ance	Diameter	
	Displacement	Angle	Angle	Pressure	Height	(ir	1.)	(i	in.)
Year	Liters (cc)	(deg.)	(deg.)	(lbs. @ in.)	(in.)	Intake	Exhaust	Intake	Exhaust
2009	1.6 (N12)	1	45	NS	NS	2	2	0.0234-	0.0234-
						0.0197	0.0197	0.0235	0.0235
	1.6 (N14)	1	45	NS	NS	2	2	0.0234-	0.0234-
						0.0197	0.0197	0.0235	0.0235
2010	1.6 (N12)	1	45	NS	NS	2	2	0.0234-	0.0234-
						0.0197	0.0197	0.0235	0.0235
	1.6 (N14)	1	45	NS	NS	2	2	0.0234-	0.0234-
						0.0197	0.0197	0.0235	0.0235

NS: Not specified by the manufacturer

① Valve seat angle: 45 degrees Correction angle outside: 15 degrees

To reset, press the on-board computer button on the turn-signal/main-bean switch and hold it until the word "RESET" appears in the display.

② To measure: Insert a new valve into guide with end of valve flush with end of guide.

Use a dial indicator to measure axial valve head movement.

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CAMSHAFT SPECIFICATIONS

All measurements in inches unless noted

	Engine						
	Displacement		Brg. Oil	Shaft	Circle	Lobe	Height
Year	Liters (cc)	Journal Dia.	Clearance	End-play	Runout	Intake	Exhaust
2009	1.6 (N12)	NS	NS	0.0015-	0.0014-	NS	NS
				0.0035	0.0028		
	1.6 (N14)	NS	NS	0.0015-	0.0014-	NS	NS
				0.0035	0.0028		
2010	1.6 (N12)	NS	NS	0.0015-	0.0014-	NS	NS
				0.0035	0.0028		
	1.6 (N14)	NS	NS	0.0015-	0.0014-	NS	NS
				0.0035	0.0028		

NS: Not specified by the manufacturer

CRANKSHAFT AND CONNECTING ROD SPECIFICATIONS

All measurements are given in inches.

	Engine		Crankshaft			Connecting Rod				
	Displacement	Main Brg.	Main Brg. Oil	Shaft	Thrust	Journal	Oil	Side		
Year	Liters (cc)	Journal Dia.	Clearance	End-play	on No.	Diameter	Clearance	Clearance		
2009	1.6 (N12)	1.7542-	0.0010-	0.0058-	NS	1.5980-	0.0008-	NS		
		1.7550	0.0016	0.0019		1.5986	0.0025			
	1.6 (N14)	1.7542-	0.0010-	0.0058-	NS	1.5980-	0.0008-	NS		
	' '	1.7550	0.0016	0.0019		1.5986	0.0025			
2010	1.6 (N12)	1.7542-	0.0010-	0.0058-	NS	1.5980-	0.0008-	NS		
		1.7550	0.0016	0.0019		1.5986	0.0025			
	1.6 (N14)	1.7542-	0.0010-	0.0058-	NS	1.5980-	0.0008-	NS		
		1.7550	0.0016	0.0019		1.5986	0.0025			

NS: Not specified by the manufacturer

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PISTON AND RING SPECIFICATIONS

	Engine			Ring Gap		Ri	ing Side Clearand	e
	Displacement	Piston	Тор	Bottom	Oil	Тор	Bottom	Oil
Year	Liters (cc)	Clearance	Compression	Compression	Control	Compression	Compression	Control
2009	1.6 (N12)	NS	0.0097-	0.0136-	0.0039-	0.0011-	0.0011-	0.0011-
			0.0136	0.0195	0.0136	0.0027	0.0027	0.0027
	1.6 (N14)	NS	0.0097-	0.0136-	0.0039-	0.0011-	0.0011-	0.0011-
	` '		0.0136	0.0195	0.0136	0.0027	0.0027	0.0027
2010	1.6 (N12)	NS	0.0097-	0.0136-	0.0039-	0.0011-	0.0011-	0.0011-
	\ \ \ \ \ \		0.0136	0.0195	0.0136	0.0027	0.0027	0.0027
	1.6 (N14)	NS	0.0097-	0.0136-	0.0039-	0.0011-	0.0011-	0.0011-
	, , ,		0.0136	0.0195	0.0136	0.0027	0.0027	0.0027

TORQUE SPECIFICATIONS

All readings in ft. lbs.

		Engine	Cylinder	Main	Rod	Crankshaft	:				Oil Pan
		Displacement	Head	Bearing	Bearing	Damper	Flywheel	Mar	nifold	Spark	Drain
Year	Model	Liters (VIN)	Bolts	Bolts	Bolts	Bolts	Bolts	Intake	Exhaust	Plugs	Plug
2009	Cooper	R56	1	2	3	NS	4	11	18	20	22
	Cooper Clubman	R55	1	2	3	NS	4	11	18	20	22
	Cooper Clubman JCW	R55	1	2	3	NS	4	11	18	20	22
	Cooper Convertible	R57	1	2	3	NS	4	11	18	20	22
	Cooper S	R56	1	2	3	NS	4	(5)	18	20	18
	Cooper S JCW	R56	1	2	3	NS	4	(5)	18	20	18
	Cooper S Clubman	R55	1	2	3	NS	4	(5)	18	20	18
	Cooper S Convertible	R57	1	2	3	NS	4	(5)	18	20	18
	Cooper S Convertible JCW	R57	1	2	3	NS	4	(5)	18	20	18
2010	Cooper	R56	1	2	3	NS	4	11	18	20	22
	Cooper Clubman	R55	1	2	3	NS	4	11	18	20	22
	Cooper Clubman JCW	R55	1	(2)	3	NS	4	11	18	20	22
	Cooper Convertible	R57	1	2	3	NS	4	11	18	20	22
	Cooper S	R56	1	2	3	NS	4	(5)	18	20	18
	Cooper S JCW	R56	1	2	3	NS	4	(5)	18	20	18
	Cooper S Clubman	R55	1	2	3	NS	4	(5)	18	20	18
	Cooper S Convertible	R57	1	2	3	NS	4	(5)	18	20	18
	Cooper S Convertible JCW	R57	1	2	3	NS	4	(5)	18	20	18

¹ Step 1: Bolts 1 through 10: 22 ft. lbs.

② Inner (M9) bolts: 22 ft. lbs. plus 150 degrees Outer (M6) bolts: 7 ft. lbs.

③ Step 1: 44 inch lbs.

Step 2: 132 inch lbs.

Step 3: Plus 90 degrees

4 Step 1: 72 inch lbs.

Step 2: 22 ft.lbs.

Step 3: Plus 90 degrees

(5) M8 bolts: 11 ft.lbs. Hexagon nut: 15 ft. lbs.

Step 2: Bolts 1 through 10 tighten an additioNSI 90 degrees

Step 3: Bolts 1 through 10 tighten an additioNSI 90 degrees

Step 4: Bolts 11 through 12: 11 ft. lbs.

Step 5: Bolts 11 through 12 tighten an additioNSI 90 degrees

Step 6: Bolts 11 through 12 tighten an additioNSI 90 degrees

Step 7: Screw replaced and tightened to 22 ft. lbs.

WHEEL ALIGNMENT

			Cast	er	Can	Camber		
				Preferred				
			Range	Setting	Range	Setting	Toe-in	
Year	Model	(+/-Deg.)	(Deg.)	(+/-Deg.)	(Deg.)	(Deg.)		
2009	Cooper (R55)	F	0.25	(1)	0.42	-0.50	0.2+/-0.17	
	Cooper (1.100)	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper Clubman (R55)	F	0.25	①	0.42	-0.50	0.2+/-0.17	
	,	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper Clubman JCW (R55)	F	0.25	①	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper Convertible (R57)	F	0.25	①	0.42	-0.50	0.2+/-0.17	
	,	R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S (R56)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S JCW (R56)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S Clubman (R55)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R		_	0.33	-1.75	0.4+/-0.13	
	Cooper S Convertible (R57)	F	0.25	1	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S Convertible JCW (R57)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
2010	Cooper (R55)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper Clubman (R55)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper Clubman JCW (R55)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R		_	0.33	-1.75	0.4+/-0.13	
	Cooper Convertible (R57)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R		_	0.33	-1.75	0.4+/-0.13	
	Cooper S (R56)	F	0.25	1	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S JCW (R56)	F	0.25	1	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S Clubman (R55)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S Convertible (R57)	F	0.25	1)	0.42	-0.50	0.2+/-0.17	
		R	_	_	0.33	-1.75	0.4+/-0.13	
	Cooper S Convertible JCW (R57)	F	0.25	1	0.42	-0.50	0.2+/-0.17	
		R	_		0.33	-1.75	0.4+/-0.13	

NOTE: Refer to an authoized BMW alignment tool for individual specifications by VIN.

① Difference between left/right max. 0.5 degrees

TIRE, WHEEL AND BALL JOINT SPECIFICATIONS

		OEM Tires			Tire Press	sures (psi)	Wheel	Ball	Lug Nut
Year	Model	Standard Optional		ıl	Front	Rear	Size	Joint	(ft. lbs)
2009	Cooper	175/65R15	195/55R	16	1	1	15 X 5.5J	NS	103
			205/45R1	7-	0		16 X 6.5J	NS	
	Cooper S	195/55R16	205/40R ²	8	1	1			103
	Cooper Convertible	175/65R15	195/55R	16	1	1	15 X 5.5J	NS	103
			195/55R1	6-			16 X 6.5J	NS	
			205/45R1	7-	1	1			
	Cooper S Convertible	175/65R15	205/40R	8					103
2009	Cooper	175/65R15	195/55R	16	1	1	15 X 5.5J	NS	103
			205/45R1	7-	0		16 X 6.5J	NS	
	Cooper S	195/55R16	205/40R ²	8	1	1			103
	Cooper Convertible	175/65R15	195/55R	16	1)	1	15 X 5.5J	NS	103
			195/55R1	6-			16 X 6.5J	NS	
			205/45R1	7-	1	1			
	Cooper S Convertible	175/65R15	205/40R ²	8					103

OEM: Original Equipment Manufacturer

PSI: Pounds Per Square Inch

① See specification in owners manual

137698_MINI_C0012

BRAKE SPECIFICATIONS

All measurements in inches unless noted

							Brake	Drum Dia	ameter	Min.	Brake Caliper	
			Brake Disc				ginal	Max.	Maximum	Lining	Bracket	Mounting
			Original	Minimum	Maximum	In	side	Wear	Machine	Thick-	Bolts	Bolts
Year	Model		Thickness	Thickness	Run-out	Dia	meter	Limit	Diameter	ness	(ft. lbs.)	(ft. lbs.)
2009	R55	F	NA	1	NA		NA	NA	NA	NA	81	26
		R	NA	1	NA		NA	NA	NA	NA	48	26
	R56	F	NA	1	NA		NA	NA	NA	NA	81	26
		R	NA	1	NA		NA	NA	NA	NA	48	26
	R57	F	NA	1	NA		NA	NA	NA	NA	81	26
		R	NA	1	NA		NA	NA	NA	NA	48	26
2010	R55	F	NA	1	NA		NA	NA	NA	NA	81	26
		R	NA	1	NA		NA	NA	NA	NA	48	26
	R56	F	NA	1	NA		NA	NA	NA	NA	81	26
		R	NA	1	NA		NA	NA	NA	NA	48	26
	R57	F	NA	1	NA		NA	NA	NA	NA	81	26
		R	NA	1	NA		NA	NA	NA	NA	48	26

F: Front

R: Rear

NA: Not available

1 Minimum thickness is stamped in the brake disc shell

SCHEDULED MAINTENANCE INTERVALS

MINI

MINI vehicles follow a maintenance schedule as programmed into the vehicle called the Condition Based Service (CBS) system. Calculation of oil changes is determined by the CBS system and the remainder of maintenance services are determined by the CBS system. Mileage based maintenance intervals are not used. The only exceptions are as follows:

Brake Fluid: Every two years Air Filter: Every 2nd oil change Spark plugs: Every 2nd oil change

Spark plugs (John Cooper Works): Every oil change Passenger compartment microfilter: Every oil change

RESET PROCEDURE

The following sequence must be observed if you are resetting with the trip meter reset button:

Switch on terminal 15.

Press and hold the trip meter reset button for approx. 10 seconds until the 1st maintenance service appears in the LCD display.

The upper display in the speedometer is lit up by a symbol (example: an oil can is the symbol for an oil change).

The lower display in the speedometer shows the time or distance remaining until the next service is due (example: 14000).

Scroll by repeatedly pressing the on-board computer button.

To reset, press the on-board computer button on the turn-signal/main-bean switch and hold it until the word "RESET" appears in the display.

Pressing the on-board computer button again will reset the service shown n the upper display.

Repeat this procedure for every service that is to be reset.

Change year with rocker switch on direction indicator/main-beam switch.

Press on-board computer button to confirm.

BRAKES

ANTI-LOCK SYSTEMS

- Certain components within the ABS system are not intended to be serviced or repaired individually.
- Do not use rubber hoses or other parts not specifically specified for and ABS system. When using repair kits, replace all parts included in the kit. Partial or incorrect repair may lead to functional problems and require the replacement of components.
- Lubricate rubber parts with clean, fresh brake fluid to ease assembly. Do not use shop air to clean parts; damage to rubber components may result.
- Use only DOT 3 brake fluid from an unopened container.
- If any hydraulic component or line is removed or replaced, it may be necessary to bleed the entire system.
- A clean repair area is essential. Always clean the reservoir and cap thoroughly before removing the cap. The slightest amount of dirt in the fluid may plug an orifice and impair the system function. Perform

INFORMATION AND PRECAUTIONS

repairs after components have been thoroughly cleaned; use only denatured alcohol to clean components. Do not allow ABS components to components have been thoroughly denatured alcohol to clean components have been thoroughly denatured alcohol to clean components.

- The Anti-Lock control unit is a microprocessor similar to other computer units in the vehicle. Ensure that the ignition switch is **OFF** before removing or installing controller harnesses. Avoid static electricity discharge at or near the controller.
- If any arc welding is to be done on the vehicle, the control unit should be unplugged before welding operations begin.

DISC AND DRUM SYSTEMS

** CAUTION

Dust and dirt accumulating on brake parts during normal use may contain asbestos fibers from production or aftermarket brake linings.

Breathing excessive concentrations of asbestos fibers can cause serious bodily harm. Exercise care when servicing brake parts. Do not sand or grind brake lining unless equipment used is designed to contain the dust residue. Do not clean brake parts with compressed air or by dry brushing. Cleaning should be done by dampening the brake components with a fine mist of water, then wiping the brake components clean with a dampened cloth. Dispose of cloth and all residue containing asbestos fibers in an impermeable container with the appropriate label. Follow practices prescribed by the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) for the handling, processing, and disposing of dust or debris that may contain asbestos fibers.

BRAKES

BLEEDING PROCEDURE

BLEEDING PROCEDURE

ABS/ASC+T

- 1. Before servicing the vehicle, refer to the precautions.
- 2. Connect pressurized brake bleeder to the reservoir.

** CAUTION

Charging pressure should not exceed 2 bar (29 psi)

Front

- 1. Connect bleeder hose and collecting container to the right front brake.
 - 2. Open the bleeder valve.
- 3. Fully depress brake pedal at least 12 times until brake fluid emerges clear and without air bubbles.
 - 4. Hold the brake pedal down.
 - 5. Close the bleeder valve
 - 6. Repeat for the left front brake.
- 7. Remove the pressurized brake bleeder.
 - 8. Test for proper brake operation.
- 9. Connect bleeder hose and collecting container to the right front brake.
 - 10. Open the bleeder valve.
 - 11. Fully depress brake pedal at least 12

BLEEDING THE BRAKE SYSTEM

- times until brake fluid emerges clear and without air bubbles.
 - 12. Hold the brake pedal down.
 - 13. Close the bleeder valve
 - 14. Repeat for the left front brake.
- 15. Remove the pressurized brake bleeder.
 - 16. Test for proper brake operation.

Rear

- 1. Connect blee ter hose and collecting container to the right rear brake.
- 2. Open the bleeder valve and flush until clear brake fluid emerges with no air bubbles.
 - Close the bleed valve.
 - 4. Repeat for the left rear brake.
- 5. Connect bleeder hose and collecting container to the right rear brake.
- Open the bleeder valve and flush until clear brake fluid emerges with no air bubbles.
 - 7. Close the bleed valve.
 - 8. Repeat for the left rear brake.

DSC

- This procedure requires the use of a factory or equivalent scan tool. Refer to scan tool documentation.
- 1. Before servicing the vehicle, refer to the precautions.

- 2. Connect the scan tool and set for service function 'Bleeding ABS/DSC Hydraulics'.
- 3. Connect pressurized brake bleeder to the reservoir.

** CAUTION

Charging pressure should not exceed 2 bar (29 psi).

Front

- 1. Connect bleeder hose and collecting container to the right front brake.
 - 2. Open the bleeder valve.
 - 3. Run the scan tool bleeding routine.
- 4. Press the brake pedal 5 times. Clear and bubble-free fluid must flow out.
 - Close the bleed valve.
 - 6. Repeat for left front brake.
 - 7. Remove the pressurized brake bleeder.
 - 8. Test for proper brake operation.
- 9. Connect bleeder hose and collecting container to the right front brake.
 - 10. Open the bleeder valve.
 - 11. Run the scan tool bleeding routine.
- 12. Press the brake pedal 5 times. Clear and bubble-free fluid must flow out.
 - 13. Close the bleed valve.
 - 14. Repeat for left front brake.
 - 15. Remove the pressurized brake bleeder.
 - 16. Test for proper brake operation.

Rear

- 1. Connect bleeder hose and collecting container to the right rear brake.
 - 2. Open the bleeder valve.
- 3. Run the scan tool bleeding routine.
- 4. Press the brake pedal 5 times. Clear and bubble-free fluid must flow out.
 - 5. Close the bleed valve.
 - 6. Repeat for left rear brake.
- 7. Connect bleeder hose and collecting container to the right rear brake.
 - 8. Open the bleeder valve.

- 9. Run the scan tool bleeding routine.
- 10. Press the brake pedal 5 times. Clear and bubble-free fluid must flow out.
 - 11. Close the bleed valve.
 - 12. Repeat for left rear brake.

FLUSHING PROCEDURE

- 1. Connect bleeder hose and collecting container to the right rear brake.
- 2. Open the bleeder valve and flush until clear brake fluid emerges with no air bubbles.

- 3. Close the bleed valve.
- 4. Repeat for the left rear, right front, and left front brakes.
- Connect bleeder hose and collecting container to the right rear brake.
- Open the bleeder valve and flush until clear brake fluid emerges with no air bubbles.
 - 7. Close the bleed valve.
- 8. Repeat for the left rear, right front, and left front brakes.

BRAKES

BRAKE CALIPER

REMOVAL & INSTALLATION

See Figures 1 through 4.

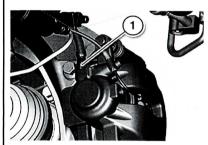
- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove front left or right wheel.
- 3. Press clutch pedal down to floor and secure with pedal support. The pedal support may only be released when the brake lines are reconnected. This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.
- 4. Pull brake hose out of holder. Grip brake hose at square head to prevent connecting piece from turning in retaining bracket.
- 5. Disconnect brake hose from brake line.
- 6. Detach brake hose from brake caliper.
- 7. Pull brake lining wear sensor out of brake lining (left side only).

- 8. Unscrew guide bolts.
- 9. Detach brake caliper in direction of arrow.

To install:

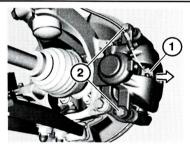
- 10. Install in the reverse order.
- 11. Replace guide screws.
- 12. Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.
- 13. First tighten brake hose on brake caliper.
- 14. Tighten bolts/nuts to specification as follows:
- 15. Brake line screw: 10 ft. lbs. (14 Nm)
- 16. Brake hose to caliper: 10 ft. lbs. (14 Nm)
- 17. Guide screws (hexagon): 26 ft. lbs. (35 Nm)
- 18. Move wheels into straight-ahead position.
- 19. Insert brake hose in bracket and screw onto brake pipe.
 - 20. Bleed the brake system.

FRONT DISC BRAKES



37698 MINI G0061

Fig. 3 Detach brake hose from brake caliper (1)



37698_MINI_G0062

Fig. 4 Pull brake lining wear sensor (1) out of brake lining (left side only). Unscrew guide bolts (2)

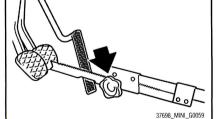


Fig. 1 Press clutch pedal down to floor and secure with pedal support. The pedal support may only be released when the brake lines are reconnected. This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened

37698_MINI_G00

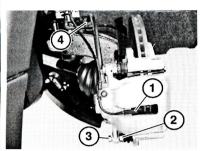
Fig. 2 Pull brake hose out of holder (1). Grip brake hose at square head (3) to prevent connecting piece from turning in retaining bracket. Disconnect brake hose from brake line (2)

DISC BRAKE PADS

REMOVAL & INSTALLATION

See Figures 5 through 10.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove front wheels.
- 3. Remove brake pad wear sensor. After removal it must be replaced (brake pad wear sensor loses its. retention capability in the break pad).
- 4. Pull brake pad wear sensor towards front out of pad (left side only).

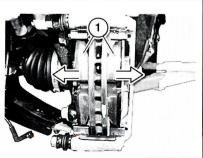


37698 MINI G0063

Fig. 5 Pull brake pad wear sensor (1) towards front out of pad (left side only). Release guide screw (3). If necessary, grip at hexagon head (2). Feed brake hose out of holder (4)

- 5. Release guide screw.
- 6. If necessary, grip at hexagon head.
- 7. Feed brake hose out of holder.
- Tilt brake caliper upwards.
- 9. Remove brake pads in direction of arrow from brake console. Mark any worn brake pads.
- 10. If replacing brake pads, remove pad retaining springs. Retaining spring for vehicles older than 48 months it is recommended to replace the retaining spring!

- 11. Install in the reverse order.
- 12. In the event of one-sided brake pad wear, do not change brake pads round. Observe minimum thickness of brake pads.
- 13. Clean brake pads. So as not to damage the surface coating, if possible do not mechanically clean the. guide surfaces for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner BMW part no. 83 19 2 154 780 and apply a thin coating of brake pad paste BMW part no. 81 22 9 407 103.



37698_MINI_G0064

Fig. 6 Remove brake pads (1) in direction of arrow from brake console

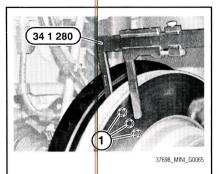
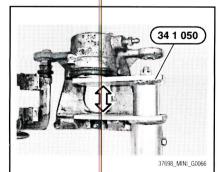


Fig. 7 Check minimum brake disc thickness

- 14. Do not apply grease to brake pad back plate.
- 15. Check minimum brake disc thickness. Position special tool 34 1 280 at three measuring points in area and measure. Compare measurement result and lowest value with set point value. New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).
- 16. Press brake piston fully back with special tool 34 1 050. When pressing piston back, note brake fluid level in expansion tank. Overflowing brake fluid will damage the paintwork.
- 17. Check dust poot for damage and replace if necessary.
- 18. Clean contact surface of brake piston with brake cleaner and apply a thin coating of brake pad paste. Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.
- 19. Clean contact surface of brake caliper with brake cleaner and apply a thin coating of brake pad paste. So as not to damage the surface coating, if possible do not mechanically clean pad guides.
- 20. So as not to damage the surface coating, if possible do not mechanically



special tool 34 1 050

Fig. 8 Press brake piston fully back with

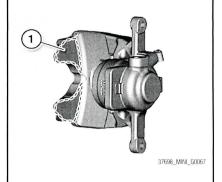


Fig. 9 Clean contact surface of brake caliper with brake cleaner and apply a thin coating of brake pad paste

clean the guide surfaces for the brake pads on the brake caliper holder. Instead, clean with brake cleaner and apply a thin coating of Never Sees Compound brake pad paste.

- 21. Brake pad with indentation is intended for accommodating the brake pad wear sensor and must be fitted on the piston side.
- 22. Replace guide screw and tighten to 26 ft. lbs. (35 Nm).
- 23. When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- 24. Fully depress brake pedal several times so that brake pads contact brake discs.
- 25. If necessary, when replacing pads, reset CBS display in accordance with factory specification.

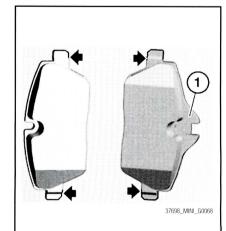


Fig. 10 Brake pad with indentation is intended for accommodating the brake pad wear sensor and must be fitted on the piston side

BRAKES

REAR DISC BRAKES

BRAKE CALIPER

REMOVAL & INSTALLATION

See Figures 11 through 13.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove front left or right wheel.
- 3. Press clutch pedal down to floor and secure with pedal support. The pedal support may only be released when the brake lines are reconnected. This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.
- 4. Detach locking clip in direction of arrow.
- 5. Disengage parking brake Bowden cable from actuating lever at brake caliper.
- 6. Feed out parking brake Bowden cable downwards.
- 7. Grip brake hose at square head so that connecting piece cannot rotate in retaining bracket.
- 8. Disconnect brake hose from brake line. .

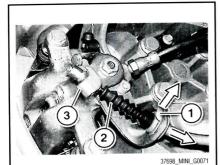
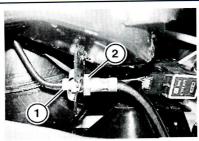


Fig. 11 Detach locking clip (1) in direction of arrow. Disengage parking brake Bowden cable (2) from actuating lever (3) at brake caliper



37698 MINI G007

Fig. 12 Grip brake hose at square head (2) and disconnect brake hose from brake line (1)

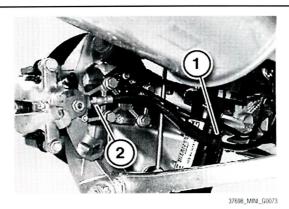


Fig. 13 Disengage brake hose from holder (1). Detach brake hose (2) from brake caliper

- 9. Disengage brake hose from holder.
- 10. Detach brake hose from brake caliper.
- 11. Pull brake lining wear sensor out of brake lining (right side only).
 - 12. Unscrew guide bolts.
 - 13. If necessary, grip at hexagon head.
 - 14. Remove brake caliper.

To install:

- 15. Install in the reverse order.
- 16. Never twist brake hose when installing it and avoid all contact with parts attached.
 - 17. rigidly to the body.
- 18. First tighten brake hose on brake
- 19. Insert brake hose in bracket and screw onto brake pipe.
- 20. Replace guide screws.
- 21. Tighten bolts/nuts to specification as follows:
 - 22. Brake line screw: 10 ft. lbs. (14 Nm)
- 23. Brake hose to caliper: 10 ft. lbs. (14 Nm)
- 24. Guide screws (hexagon): 26 ft. lbs. (35 Nm)

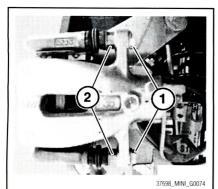
DISC BRAKE PADS

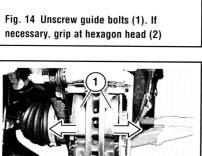
REMOVAL & INSTALLATION

See Figures 11 through 18.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove front left or right wheel.
- 3 Detach locking clip in direction of arrow.
- 4. Disengage parking brake Bowden cable from actuating lever at brake caliper.
- 5. Feed out parking brake Bowden cable downwards.

- 6. Both guide bolts must be released and then the brake caliper detached towards the rear!.
- 7. The springs may be bent when only one bolt is released and the brake caliper is folded up!.
- 8. Unscrew guide bolts. If necessary, grip at hexagon head.
- 9. Mark any worn brake pads. In the event of one-sided brake pad wear, do not change brake pads round.
- 10. Remove brake pads in direction of arrow from brake console. Observe minimum thickness of brake pads. Clean brake pads. Do not apply grease to brake pad back plate.
- 11. Remove lining springs and replace.
- 12. Check minimum brake disc thickness. Position special tool 34 1 280 at three measuring points in area and measure. Compare measurement result and lowest value with set point value . .
- 13. New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).
- 14. Screw brake piston with special tools 34 6 309, 34 6 306, 34 6 307, 34 6 308 into brake caliper. When pressing piston back, note brake fluid level in expansion tank. Overflowing brake fluid will damage the paintwork.
- 15. Check dust boot for damage and replace if necessary.
- 16. Clean contact surface of brake piston with brake cleaner and apply a thin coating of brake.
- 17. pad paste. Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.
 - 18. Clean contact surface of brake





37698_MINI_G0064

Fig. 15 Remove brake pads (1) in direction of arrow from brake console

caliper with brake cleaner and apply a thin coating of brake pad paste. .

19. Brake pad with indentation is intended for accommodating the brake pad

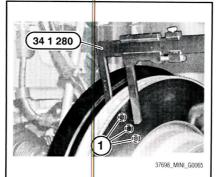


Fig. 16 Check minimum brake disc thickness

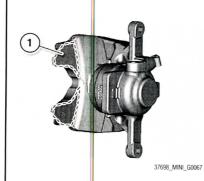


Fig. 17 Clean contact surface of brake caliper with brake cleaner and apply a thin coating of brake pad paste

wear sensor and must be fitted on the piston side.

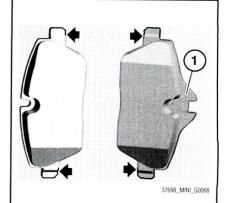


Fig. 18 Brake pad with indentation is intended for accommodating the brake pad wear sensor and must be fitted on the piston side

- 20. So as not to damage the surface coating, if possible do not mechanically clean pad guides. Instead, clean with brake cleaner and apply a thin coating of brake pad paste.
- 21. When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- 22. Replace guide screw and tighten to 26 ft. lbs. (35 Nm).
- 23. Fully depress brake pedal several times so that brake pads contact brake discs.
- 24. If necessary, when replacing pads, reset CBS display in accordance with factory specification.

BRAKES

PARKING BRAKE CABLES

REMOVAL & INSTALLATION

See Figures 19 through 21.

1. Before servicing the vehicle, refer to the precautions.

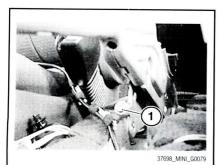


Fig. 19 Release adjusting fixture (1) for parking brake Bowden cable

- 2. Remove bracket on centre console.
- 3. Release heat shield and slide over exhaust system.
- 4. Release adjusting fixture for parking brake Bowden cable.
- 5. Detach both parking brake Bowden cables from balance arm.

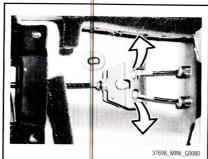
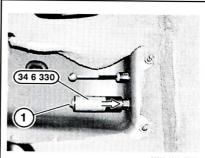


Fig. 20 Detach both parking brake Bowden cables from balance arm

PARKING BRAKE

- 6. Attach special tool 34 6 330 to parking brake Bowden cable.
- 7. Slide special tool 34 6 330 in direction of arrow onto barbs of park-



37698_MINI_G008

Fig. 21 Release cable assemblies from clips (1) on fuel tank. Release screws (2) and remove bracket from control arm at top

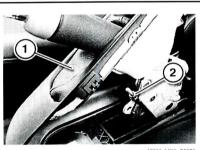
ing brake Bowden cable until barbs are

- 8. Push parking brake Bowden cable towards rear.
- 9. Release cable assemblies from clips on fuel tank.
- 10. Release screws and remove bracket from control arm at top.
- 11. After completing tasks, adjust handbrake.

ADJUSTMENT

See Figures 22 through 24.

- 1. Before servicing the vehicle, refer to the precautions.
- 2. When 1st ratchet is engaged, no braking force should be exerted.
- 3. The difference in wheel circumferential forces between the left and right wheels may deviate by max, 30 % from the greater value (measured on brake analyzer).
- 4. In event of larger deviations of wheel circumferential force: readjust parking brake.
- 5. Braking with locked wheels must be possible with the parking brake.
- 6. The parking brake must be reset if the actuation stroke is greater than 6 teeth.
- 7. Accurate adjustment of the parking brake is only possible if the parking brake Bowden cables and all moving parts on the parking brake move easily and function correctly.
- 8. Release gaiter of parking brake lever from clip.
- 9. Release self-locking nut until the load on the Bowden cable has been relieved completely.



37698_MINI_G0076

Fig. 22 Release gaiter (1) of parking brake lever from clip. Release self-locking nut (2) until the load on the Bowden cable has been relieved completely

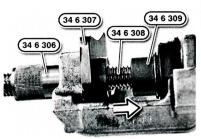
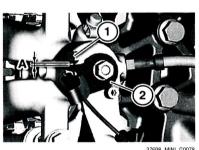


Fig. 23 Insert brake piston into brake caliper with special tools

- 10. Remove rear brake pads.
- 11. Insert brake piston into brake caliper with special tools 34 6 309, 34 6 306, 34 6 307, 34 6 308.
 - 12. Install brake pads.

To Adjust:

- 13. Screw in adjusting nut on parking brake lever until a gap of 0.5-1.5 mm between parking brake actuating lever and stop is set at brake calipers.
- 14. Release adjusting nut on parking brake lever completely.
 - 15. Remove brake pads.
- 16. Insert brake piston into brake caliper.
 - 17. Install brake pads.
- 18. Adjust adjusting nut on parking brake lever as shown above.
- 19. Apply parking brake lever three times.
- 20. Press brake pedal to floor at least three times so that air gap can be set.



37698 MINI G0078

Fig. 24 Screw in adjusting nut on parking brake lever until a gap (A) of 0.5-1.5 mm between parking brake actuating lever (2) and stop (1) is set at brake calipers

21. Carry out operational check.

PARKING BRAKE SHOES

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions.
- 2. When 1st ratchet is engaged, no braking force should be exerted.
- 3. The difference in wheel circumferential forces between the left and right wheels may deviate by max. 30 % from the greater value (measured on brake analyzer).
- 4. In event of larger deviations of wheel circumferential force: readjust parking brake.
- 5. Braking with locked wheels must be possible with the parking brake.
- 6. The parking brake must be reset if the actuation stroke is greater than 6 teeth.
- 7. Accurate adjustment of the parking brake is only possible if the parking brake Bowden cables and all moving parts on the parking brake move easily and function correctly.
- 8. Release gaiter of parking brake lever from clip.
- 9. Release self-locking nut until the load on the Bowden cable has been relieved completely.
 - 10. Remove rear brake pads.
- 11. Insert brake piston into brake caliper with special tools 34 6 309, 34 6 306, 34 6 307, 34 6 308.
 - 12. Install brake pads.

To Adjust:

- 13. Screw in adjusting nut on parking brake lever until a gap of 0.5-1.5 mm between parking brake actuating lever and stop is set at brake calipers.
- 14. Release adjusting nut on parking brake lever completely.
 - 15. Remove brake pads.
 - 16. Insert brake piston into brake caliper.
 - 17. Install brake pads.
- 18. Adjust adjusting nut on parking brake lever as shown above.
- 19. Apply parking brake lever three times.
- 20. Press brake pedal to floor at least three times so that air gap can be set.
 - 21. Carry out operational check.

CHASSIS ELECTRICAL

AIR EAG (SUPPLEMENTAL RESTRAINT SYSTEM)

GENERAL INFORMATION

** CAUTION

These vehicles are equipped with an air bag system. The system must be disarmed before performing service on, or around, system components, the steering column, instrument panel components, wiring and sensors. Failure to follow the safety precautions and the disarming procedure could result in accidental air bag deployment, possible injury and unnecessary system repairs.

SERVICE PRECAUTIONS

** CAUTION

Disconnect and isolate the battery negative cable before beginning any airbag system component diagnosis, testing, removal, or installation procedures. Wait at least 90 seconds after the ignition switch is turned off and the negative (-) terminal cable is disconnected from the battery before starting the operation. The SRS is equipped with a backup power source, so if work is started within 90 seconds after disconnecting the negative (-) terminal cable from the battery, the SRS may be deployed. Failure to disable the airbag system may result in accidental airbag deployment, personal injury, or death.

DISARMING THE SYSTEM

- 1. Before servicing the vehicle, refer to the precautions.
- 2. Place the ignition switch in the **OFF** position.
- 3. Disconnect the negative battery terminal and cover the battery terminal to prevent accidental contact.
- 4. Once the battery has been disconnected, wait for a period of approximately 10 minutes allowing the capacitor in the control unit to discharge.

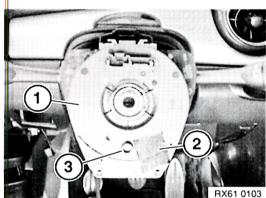
ARMING THE SYSTEM

When repairs are completed, connect the negative battery cable.

CLOCKSPRING CENTERING

See Figure 25.

- 1. If unauthorized rotation of volute spring cassette cannot be ruled out, it is essential to return volute spring cassette to centre position.
- 2. Turn volute spring counterclockwise as far as it will go.
- 3. Turn volute spring clockwise as far as it will go.
- 4. Turn volute spring back to centre position and secure so that centering pin is at bottom position.



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Fig. 25 Secure volute spring cassette (1) against rotating with adhesive tape (2). Secure so that centering pin (3) is at bottom position

DRIVE TRAIN

MANUAL TRANSAXLE ASSEMBLY

REMOVAL & INSTALLATION

Cooper

See Figures 26 through 28.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Disconnect negative battery cable.
 - 3. Remove battery and battery box.
 - 4. Remove manifold heat shield.
 - 5. Remove engine stabilizer (upper).
- 6. Remove fuel and vent pipes from bracket near stabilizer.
 - 7. Drain transaxle.
 - 8. Remove front left wheel well liner.

- 9. Remove driveshafts with steering knuckle carrier.
 - 10. Remove lower stabilizer.
 - 11. Remove front subframe.
- 12. Remove gearshift cables from ball joint attachment.
 - 13. Remove gearshift cable bracket.
- 14. Remove clutch slave cylinder from transaxle.
- 15. Remove reverse lamp connector from transaxle.
- 16. Remove brake booster pipe from manifold (push down circular ring to release).
- 17. Remove coo ant pressure cap from fill tower.
- 18. Remove oxygen sensor bracket, coolant hose clamp and bolt.

19. Install a engine lifting eye bracket, 11-8-260 as shown.

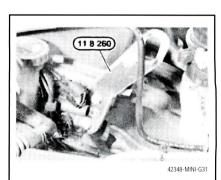


Fig. 26 Installing engine lifting eye bracket—Cooper

- 20. Support the engine with lifting equipment.
- 21. Raise equipment enough to take weight of engine and transaxle.
- 22. Remove the upper bracket retaining bolt (1), mount to transaxle bolts (2) and remove the transaxle mount.
- 23. Lower the engine about 1.5 inches (40mm).

** CAUTION

DO NOT lower engine too much or exhaust system could be damaged. Also watch A/C pipe to compressor when lowering engine.

- 24. Remove starter heat shield.
- 25. Remove oxygen sensor wiring from clip.
 - 26. Remove starter.
- 27. Remove closure plate bracket around inner driveshaft opening.
 - 28. Support transaxle with suitable jack.
 - 29. Remove the transaxle retaining bolts.
 - 30. Remove the transaxle.

→Shorter 2 bolts are located into oil pan.

To install:

- 31. Clean all mating surfaces.
- 32. Position the transaxle into the vehicle.
- 33. Install and torque the transaxle-to-engine housing bolts to 63 ft. lbs. (85 Nm).

→2 shorter bolts go directly into oil pan.

- 34. Remove jack.
- 35. Install and torque closure plate bracket bolts to 7 ft. lbs. (9 Nm).
- 36. Install starter; torque bolts to 63 ft. lbs. (85 Nm)
- 37. Install starter heat shield; torque bolts to 7 ft. lbs. (9 Nm)
 - 38. Install starter electrical connections
- 39. Install oxygen sensor to clip near starter heat shield

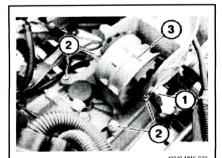


Fig. 27 Identifying the location of the

transaxle mount—Cooper

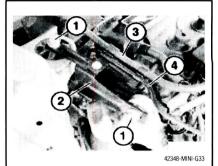


Fig. 28 Showing the upper stabilizer bracket and bolt locations, plus the location of the fuel and vent pipes—Cooper

- 40. Raise the engine back into normal position and install the transaxle mount.
- 41. Tighten bolts/nuts to specification as follows:
 - Mount bracket-to-transaxle: 28 ft. lbs. (38 Nm)
 - Mount-to-upper bracket: 49 ft. lbs. (66 Nm)
- 42. Slowly release engine tension from lift equipment. Remove the equipment.
- 43. Remove the engine lifting eye bracket.
 - 44. Install coolant hose, clamp and bolt.
- 45. Install oxygen sensor bracket (near coolant hose).
- 46. Install brake booster pipe to manifold.
 - 47. Install reverse light switch connector.
- 48. Install clutch slave cylinder; torque bolts to 18 ft. lbs. (24 Nm).
 - 49. Install gearshift cable and bracket.
 - 50. Install front subframe.
- 51. Install lower stabilizer bracket; torque bolts (1) to 74 ft. lbs. (100 Nm).
- 52. Install driveshafts and steering knuckle carrier.
 - 53. Install left wheel well liner.
 - 54. Refill the transaxle with proper oil.
- 55. Install the upper stabilizer bolts. Torque the bolts to 74 ft. lbs. (100 Nm).
- 56. Attach the fuel and vent pipes to the upper stabilizer.
 - 57. Install the manifold heat shield.
 - 58. Install and connect the battery.
- 59. Start the engine and check transaxle operation.

Cooper S

See Figures 29 and 30.

- 1. Before servicing the vehicle, refer to precautions.
 - 2. Disconnect negative battery cable.
 - 3. Remove battery and battery box.

- 4. Remove intake filter housing.
- 5. Remove manifold heat shield.
- 6. Remove engine stabilizer (upper).
- 7. Remove fuel and vent pipes from bracket near stabilizer.
 - 8. Drain transaxle.
 - 9. Remove front left wheel well liner.
- 10. Remove driveshafts with steering knuckle carrier.
 - 11. Remove lower stabilizer.
 - 12. Remove crush tubes.
 - 13. Remove front subframe.
 - 14. Remove coolant expansion tank cap.
- 15. Remove oxygen sensor bracket, coolant hose clamp, and bolt.
- 16. Install an engine lifting eye bracket, 11-8-260 as shown.
- 17. Remove the gearshift cables from ball joint attachment, with special tool 23-4-010, then remove the gearshift cable mounting bracket.
- 18. Remove the clutch slave cylinder from the transaxle.
- 19. Disconnect the reverse light switch connector from the transaxle.
- 20. Open the hood to the full upright position and install strut extensions, 51-2-160, to hold the hood in this position.

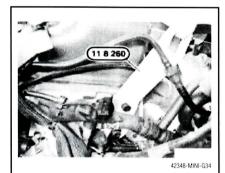
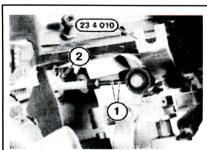


Fig. 29 Installing engine lifting eye bracket—Cooper S



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Fig. 30 Disconnect the gearshift cables from the ball joints—Cooper S

20-20 MINI COOPER

- 21. Support the engine with lifting equipment.
- 22. Raise equipment enough to take weight of engine and transaxle.
 - 23. Remove throttle housing.
 - 24. Remove supercharger intake hose.
- 25. Detach other pipes by quick-fit couplings.
- 26. Remove slave cylinder hose from transaxle and move aside.
- 27. Remove closure plate around inner driveshaft opening.
 - 28. Remove starter heat shield.
- 29. Remove oxygen sensor from clip on heat shield
- 30. Remove starter connections and move wiring harness aside.
 - 31. Remove starter.
 - 32. Remove transaxle mount.
- 33. Lower the engine about 5 inches (135 mm).
 - 34. Support transaxle with suitable jack.
 - 35. Remove the transaxle retaining bolts.
 - 36. Remove the transaxle.

To install:

- 37. Clean all mating surfaces.
- 38. Position the transaxle into the vehicle.
- 39. Install and torque the transaxle-to-engine housing bolts to 63 ft. lbs. (85 Nm).
 - 40. Remove jack.
 - 41. Raise the engine to normal position.
- 42. Install transaxle mount; torque bolts to 49 ft. lbs. (66 Nm).
- 43. Install starter; torque bolts to 63 ft. lbs. (85 Nm).
- 44. Install starter electrical connections and wiring harness.
- 45. Install oxygen sensor to clip near starter heat shield.
- 46. Install starter heat shield; torque bolts to 7 ft. lbs. (9 Nm).
- 47. Install closure plate bolts; torque to 7 ft. lbs. (9 Nm).
- 48. Install the lower support bracket and torque the bolts as follows:
- 49. Tighten bolts/nuts to specification as follows:
 - Mount bracket-to-transaxle: 28 ft. lbs. (38 Nm)
 - Mount-to-upper bracket: 49 ft. lbs. (66 Nm)
 - 50. Install MAP sensor.
- 51. Install slave cylinder hose to transaxle.
 - 52. Install supercharger, pipes and hoses.
 - 53. Install reverse light switch connector.
- 54. Install slave cylinder to transaxle; torque bolts to 18 ft. lbs. (24 Nm).
 - 55. Install gearshift cables and bracket.
- 56. Slowly release engine tension from lift equipment. Remove the equipment.

- 57. Remove the engine lifting eye bracket.
 - 58. Install coolant hose, clamp and bolt.
- 59. Install oxygen sensor bracket (near coolant hose).
- 60. Install the front subframe; torque bolts to 74 ft. lbs. (100 Nm).
- 61. Reinstall the MFE to its normal position.
- 62. Tighten bolts/nuts to specification as follows:
 - M8x30 bolts: 17 ft. lbs. (22 Nm)
 - M6x16 bolts: 3 ft. lbs. (5 Nm)
- 63. Install crush member-to-subframe; tighten to 74 ft. lbs. (100 Nm)
- 64. Install lower stabilizer bracket; tighten to 74 ft. lbs. (100 Nm)
- 65. Install drives hafts and steering knuckle carrier.
 - 66. Install left wheel well liner.
 - 67. Refill the transaxle with proper oil.
- 68. Install the upper stabilizer bolts. Torque the bolts to 74 ft. lbs. (100 Nm).
- 69. Attach the fuel and vent pipes to the upper stabilizer.
 - 70. Install the manifold heat shield.
 - 71. Install and connect the battery.
- 72. Start the engine and check transaxle operation.

HALFSHAFTS

REMOVAL & INSTALLATION

See Figures 31 and 32.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove front wheel.
 - 3. Remove front wheel hub nut.
 - 4. Drain transaxle.
- 5. Remove brake caliper from disc (tie out of way; hose connected).
- 6. Remove tie rod ball joint from steering knuckle.
- 7. Remove ABS sensor from steering knuckle.
- 8. Remove control arm from steering knuckle.
- On right side driveshaft only, remove bolts holding the intermediate shaft housing to the bracket.
- 10. Pull the driveshaft from transaxle (discard snap ring).
- 11. Remove the tolt holding the steering knuckle to the McPherson strut, then lift the steering knuckle out with the driveshaft.

To install:

- 12. Install in the reverse order.
- 13. Install a new snap ring on the end of the driveshaft inner spline.
- 14. Install a special seal protector tool, 24-8-120, into side of transaxle.

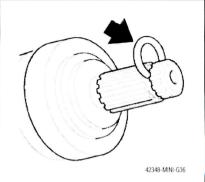


Fig. 31 Installing a new snap ring on driveshaft inner spline

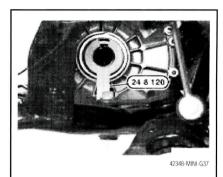


Fig. 32 Showing special seal protector tool installed in transaxle

- 15. Position the driveshaft to the transaxle and insert into to seal. Pull on the special tool handle to remove once the driveshaft is in position.
- 16. Push in output shaft over the resistance of the retaining ring until it snaps in place.
- 17. Install the steering knuckle to the McPherson strut. Torque the retaining bolt to 60 ft. lbs. (81 Nm).
- 18. Install the intermediate shaft housing to the bracket. Torque the retaining bolts to 18 ft. lbs. (25 Nm).
- 19. Tighten bolts/nuts to specification as follows:
 - Control arm to steering knuckle; torque new nut to 41 ft. lbs. (56 Nm)
 - ABS sensor to steering knuckle; torque to 6 ft. lbs. (8 Nm)
 - Tie rod to steering knuckle; torque new ball joint nut to 38 ft. lbs. (52 Nm)
 - Brake caliper to disc; torque caliper guide bolts to 23 ft. lbs. (31 Nm)
 - Front wheel hub nut; torque new nut to 134 ft. lbs. (182 Nm)
 - Front wheel
 - 20. Refill the transaxle.

ENGINE COOLING

ENGINE FAN

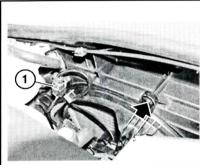
REMOVAL & INSTALLATION

See Figures 33 and 34.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Unlock plug and remove.
 - 3. Release screw.
- 4. Unlock fan cowl duct in direction of arrow and remove.

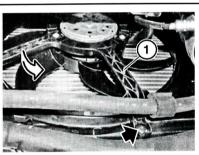
To install:

5. Install in the reverse order.



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Fig. 33 Unlock plug (1) and remove



37698_MINI_G0124

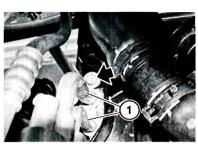
Fig. 34 Unlock fan cowl duct (1) in direction of arrow and remove

RADIATOR

REMOVAL & INSTALLATION

See Figures 35 through 37.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Drain the cooling system.
 - 3. Remove the front bumper trim.
- 4. Remove the outside air temperature sensor cable, if applicable.
- 5. Remove the front bumper trim carrier.
 - 6. Remove oil cooler, if equipped.



7698 MINI

Fig. 35 Release retaining screws for refrigerant lines (1) on front panel

7. Remove the upper radiator hose.

→It is not necessary to discharge the air conditioning system.

- 8. Detach the condenser and lift it free of the retaining lugs.
 - 9. Remove lower radiator hose.
 - 10. Remove the radiator retaining pins.
- 11. Tilt the radiator forward and disconnect the fan relay wiring harness.
 - 12. Remove the radiator.

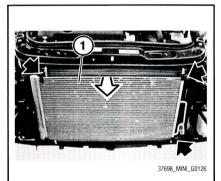
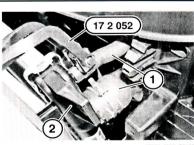


Fig. 36 Detach the condenser and lift it free of the retaining lugs



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Fig. 37 Detach coolant hoses (1), carefully feed out radiator (2) towards top and remove

To install:

- 13. Install the radiator.
- 14. Install the fan relay wiring harness.
 - 15. Install the lower radiator hose.
- 16. Set the condenser in place and attach.
 - 17. Install the upper radiator hose.
 - 18. Install the oil cooler, if equipped
 - 19. Install the front bumper trim carrier.
- 20. Install the outside air temperature sensor cable
 - 21. Install the front bumper trim.
 - 22. Fill and vent the cooling system.
- 23. Start the engine and check for leaks.

THERMOSTAT

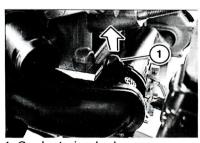
REMOVAL & INSTALLATION

See Figure 38.

- 1. Before servicing the vehicle, refer to precautions.
 - 2. Drain coolant.
- 3. For N14 engine, remove the intake air manifold
- 4. Release lock on coolant pipe in direction of arrow.
- 5. Disconnect the thermostat plug connection.
- 6. Using Special Tool No. 17 2 050, detach all coolant hoses from thermostat.
- 7. Disconnect the coolant temperature sensor plug connection.
- 8. Loosen the nut and remove the screws.
 - 9. Remove the seal.

To install:

- 10. Install in reverse order.
- 11. Replace seal.
- 12. Tighten thermostat housing to 71 inch lbs. (8 Nm).



1. Coolant pipe lock

22205_MINI_G0002

Fig. 38 Release lock on coolant pipe

WATER PUMP

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to precautions.
- 2. Remove drive belt tensioner.
- Remove screws.
- 4. Remove seal

To install:

- 5. Install in the reverse order.
- 6. Replace seal.
- 7. Clean sealing surfaces.

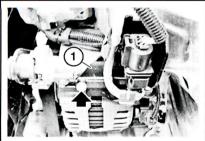
ENGINE ELECTRICAL

ALTERNATOR

REMOVAL & INSTALLATION

See Figures 39 through 42.

- 1. Before servicing the vehicle, refer to the precautions.
- 2. Check for stored fault codes, then erase fault code memory.
 - 3. Switch off ignition.
 - 4. Disconnect the battery.
- 5. Move the front panel into assembly position.
- 6. For N14 engines, remove the bolt, then remove the bracket and place to one side.
- 7. Bring belt tensioner with wrench into assembly position and hold.
- 8. Secure assembly position of belt tensioner by sliding locating pin in direction of arrow.



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Fig. 39 For N14 engines, remove the bolt, then remove the bracket and place to one side

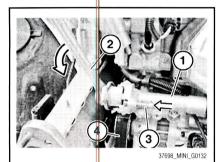


Fig. 40 Secure assembly position of belt tensioner (1) by sliding locating pin (3) in direction of arrow. Remove wrench (2). Remove drive belt (4) from alternator

** CAUTION

Remove wrench again from belt tensioner.

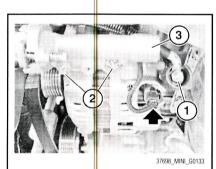


Fig. 41 Release nut (1) and remove battery positive lead. Release screws (2) and remove belt tensioner (3)

CHARGING SYSTEM

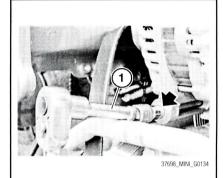


Fig. 42 Release screw with joint extension (1)

- 9. Unlock connector and remove.
- 10. Release nut and remove battery positive lead.
- 11. Release screws and remove the belt tensioner.
- 12. Release screw with joint extension.
 - 13. Remove alternator.

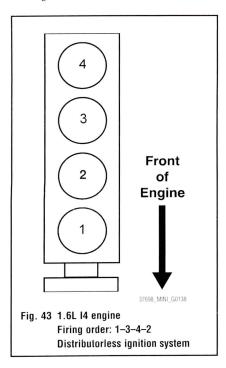
To install:

- 14. Install in the reverse order.
- 15. Tighten bolts/nuts to specification as follows:
 - Alternator to crankcase: 15 ft. lbs. (20 Nm)
 - Battery positive lead to alternator: 10 ft. lbs. (13.5 Nm)
 - Friction gear to crankcase: 71 inch lbs. (8 Nm)

ENGINE ELECTRICAL

FIRING ORDER

See Figure 43.



IGNITION COIL PACK

REMOVAL & INSTALLATION

See Figures 44 and 45.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Check for stored fault codes.

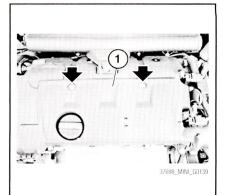


Fig. 44 Remove upper engine cover (1)

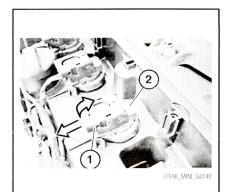


Fig. 45 Unlock plug retainer (1) of ignition coil (2) and disconnect plug

- 3. Turn ignition off.
- 4. Remove upper engine cover.
- 5. Unlock the plug retainer of ignition coil and disconnect the plug.

IGNITION SYSTEM

6. Pull the ignition coil up and out.

To install:

7. Installation is the reverse of removal.

SPARK PLUGS

REMOVAL & INSTALLATION

1. Before servicing the vehicle, refer to the precautions section.

** WARNING

Spark plugs must be replaced with the same type/number spark plug as the original. If another spark plug is substituted, damage may result.

- → Allow engine to cool completely prior to starting this procedure.
 - 2. Turn off ignition.
 - 3. Remove ignition coils.
- 4. Unscrew and remove spark plugs with Special Tools 12 1 172 and 12 1 220.

To install:

- 5. Install and tighten spark plugs, using special tools 12 1 220 in conjunction with special tool 12 1 172
- 6. If special tool 12 1 172 is not used, tighten spark plugs to 15 to 19 ft. lbs. (20 to 26 Nm).
 - 7. Reinstall the ignition coils.

ENGINE ELECTRICAL

STARTER

REMOVAL & INSTALLATION

See Figures 46 and 47.

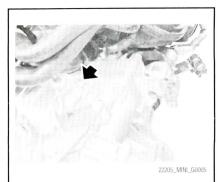


Fig. 46 Remove starter screw

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Turn ignition off.
 - 3. Disconnect the negative battery cable.
 - 4. Remove intake filter housing.
- 5. For N12 engine, remove the tank venting valve.
 - 6. Remove the right wheel.
- 7. For N14 engine, remove the bolts and lay the vacuum tank to one side.
 - 8. Release screw.
 - 9. Unlock plug and remove.
- 10. Release nut and remove battery positive lead.
 - 11. Release screws.
 - 12. Remove bracket and starter motor.

To install:

13. Install in reverse order.

STARTING SYSTEM

- 14. Install starter and fit screws.
- 15. Press starter in direction of arrow and tighten down.

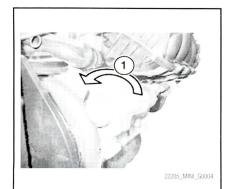


Fig. 47 Install starter

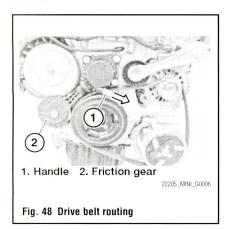
ENGINE MECHANICAL

→ Disconnecting the negative battery cable may interfere with the functions of the on board computer systems and may require the computer to undergo a relearning process, once the negative battery cable is reconnected.

ACCESSORY DRIVE BELTS

ACCESSORY BELT ROUTING

See Figure 48.



INSPECTION

Inspect the drive belt for signs of glazing or cracking. A glazed belt will be perfectly smooth from slippage, while a good belt will have a slight texture of fabric visible. Cracks will usually start at the inner edge of the belt and run outward. All worn or damaged drive belts should be replaced immediately.

ADJUSTMENT

No adjustment is possible.

REMOVAL & INSTALLATION

See Figures 48 and 49.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove right wheel arch cover.
 - 3. Remove right headlight.
 - 4. Remove lock bridge.
- 5. Bring belt tensioner with wrench into assembly position.
- Secure assembly position of belt tensioner by sliding locating pin in direction of arrow.

** CAUTION

Remove wrench again from belt tensioner.

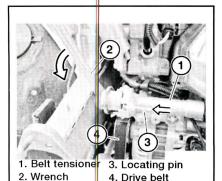


Fig. 49 Drive belt removal

7. Remove drive belt from alternator.

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- 8. Move friction wheel into servicing position.
- 9. In order to release the frictional connection between crankshaft and coolant pump, it is necessary to move the friction gear into the servicing position.
- 10. Firmly pull the handle in direction of arrow until friction gear is separated from belt pulley.
- 11. To secure friction gear in servicing position, suspend pull cable on housing.

To install:

12. Installation is the reverse of the removal procedure

CAMSHAFT AND VALVE LIFTERS

REMOVAL & INSTALLATION

N12 Engine

Intake

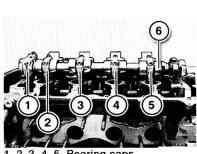
See Figures 50 through 53.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove cylinder head cover.
- 3. Remove adjusting unit for intake camshaft.
 - 4. Remove intermediate lever.
 - 5. Remove exhaust camshaft.

** WARNING

The screws of the bearing bridge must not be opened. Releasing the bearing bridge will result in damage to the cylinder head.

→ The bearing cap marked 5 is a thrust bearing.

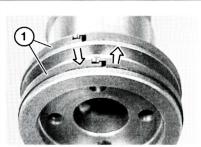


, 2, 3, 4, 5. Bearing caps

6. Camshaft

22205 MINI G0021

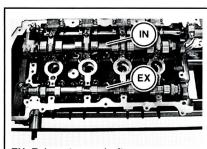
Fig. 50 Remove camshaft



1. Plain compression rings

22205 MINI G0022

Fig. 51 Plain compression rings



EX: Exhaust camshaft IN: Intake camshaft

22205_MINI_G0023

Fig. 52 Camshaft identification

- 6. Release screws of bearing caps 1 to 5.
- 7. Set all bearing caps down in special tool No. 11 4 481.
 - 8. Remove camshaft.

To install:

- 9. Install in reverse order.
- 10. Clean all bearing points and lubricate with oil.
- 11. Check plain compression rings for damage and replace if necessary.



E: Intake camshaft

22205_MINI_G0024

Fig. 53 Intake camshaft positioning

12. The plain compression rings have catches at the joint. Press plain compression rings apart upwards and downwards and remove towards front, being careful as they can break easily. Make sure they can move freely.

** WARNING

Both camshafts have different identifications. Mixing up the two camshafts will result in engine damage.

- 13. Insert camshaft so that "IN" marking points upwards.
- 14. Position inlet camshaft so that cams point upwards at an angle.
- 15. Attach special tool No. 11 9 551 to twin surface.
- 16. Make sure plain compression rings cable can move freely.
- 17. All bearing caps are identified from 5 to 10.
- 18. Tighten bearing caps from inside outwards. Tighten to 7 ft. lbs. (10 Nm).
 - 19. Adjust valve timing.

Exhaust

See Figures 51, 52, 54 through 58.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove cylinder head cover.
 - 3. Remove vacuum pump.
- 4. Remove exhaust adjusting unit for exhaust camshaft.
- 5. Release central bolt of intake adjustment unit.

** WARNING

The screws of the bearing bridge must not be opened. Releasing the bearing bridge will result in damage to the cylinder head.

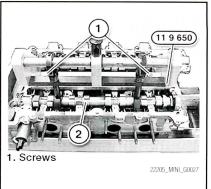


Fig. 54 Install special tool

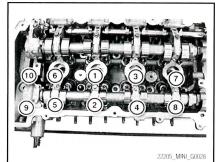


Fig. 55 Release bearing caps (shown without special tool for clarity)

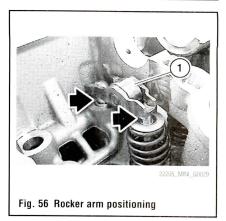
** WARNING

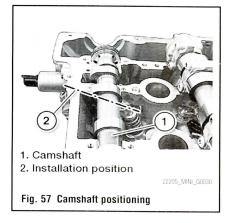
Risk of damage to spark plug bores. Check special tool No. 11 9 652 for damage.

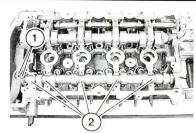
- 6. Secure special tool No. 11 9 650 on cylinder head with screws in spark plug holes.
- 7. With special tool No. 11 9 650 installed, release bearing caps from 10 to 1.
- 8. Set all bearing caps down in special tool No. 11 4 480.
- 9. Check plain compression rings for damage and replace if necessary.
- 10. The plain compression rings have catches at the joint. Press plain compression rings apart upwards and downwards and remove towards front, being careful as they can break easily. Make sure they can move freely.
- → Removal on engine: Block engine with special tool No. 11 9 590.
- →Removed cylinder head: When using special tool No. 11 9 000, it will be necessary to remove the aluminum profile insert.

To install:

- 11. Install in reverse order.
- 12. Before installing exhaust camshaft,







- 1. Plain compression rings
- 2. Bearing points

22205_MINI_G0031

Fig. 58 Positioning plain compression rings

make sure roller rocker arm is correctly seated HVCA element and valve.

- 13. Lubricate all bearing points with engine oil
- 14. Insert camshaft, paying close attention to installation position.

** WARNING

Both camshafts have different identifications. Mixing up the two camshafts will result in engine damage.

15. Make sure plain compression rings can move freely.

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- 16. Align plain compressing rings in downward direction.
- 17. Lubricate all bearing points with engine oil.
- 18. Secure special tool No. 11 9 650 on cylinder head with screws in spark plug holes.
 - 19. Fit all bearing bridges from 0 to 4.
- 20. Secure screws in sequence 1 to 10. Tighten to 7 ft. lbs. (10 Nm).
 - 21. Adjust valve timing.

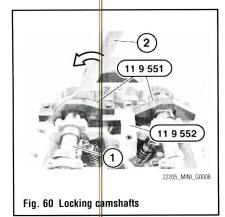
N14 Engine

See Figures 59 through 65.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove cylinder head cover.
 - 3. Check timing.
 - 4. Remove chain tensioner.
- To release central bolts, always use special tool No. 11 9 551 of exhaust camshaft.
- Position special tool No. 11 9on twin surface of exhaust camshaft.
- 7. Secure special tool No. 11 9 551 with a screw.

→ Check function of adjustment unit locking by rotating camshaft.

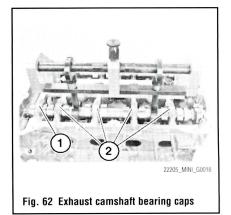
- 8. Mount special tool No. 11 9 551 on inlet and exhaust camshafts.
- 9. Screw in special tool No. 11 9 552 on cylinder head with a screw.
- 10. To release central bolts, always use special tool No. 11 9 551.
 - 11. Release screws.
 - 12. Remove clamping rail.
 - 13. Release screw.
 - 14. Release central bolt.
- 15. Feed out sprocket wheel from timing chain towards front.
 - 16. Release central bolt.
- 17. For exhaust camshaft, do not remove VANOS unit.



18. For intake camshaft, set down VANOS adjustment unit on special tool No. 11 4 480.

→With the cylinder head removed, it will be necessary to remove the aluminum profile insert when using special tool No. 11 9 000.

- 19. Screw special tool No. 11 9 661 with special tool No. 11 9 662 into spark plug holes.
- 20. For intake camshaft, turn eccentric shaft in direction of ring and lock
- 21. Release all screws on bearing caps.
- 22. Bearing cap No. 1 is a thrust bearing and has the number 0.
- 23. Bearing cap No. 2 is a thrust bearing and has the number 5.
- 24. All intake bearing caps are identified with numbers from 6 to 9.
- 25. All exhaust bearing caps are identified with numbers from 1 to 4.
 26. Intake camshaft is identified with
- 26. Intake camshaft is identified with designation (IN), and exhaust camshaft is identified with the designation (EX).
- 27. Insert camphafts so that designations (IN and EX) can be read from above.



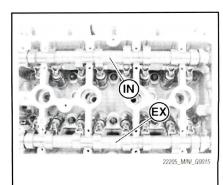
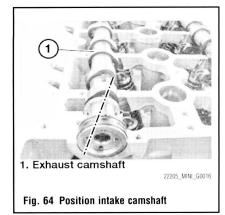


Fig. 63 Identifying intake and exhaust camshafts



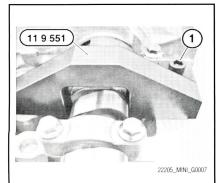
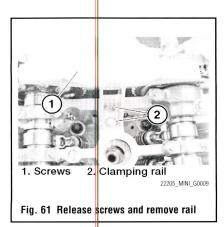
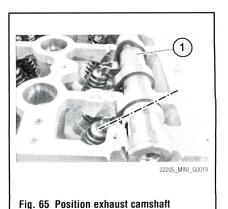


Fig. 59 Position camshaft tool





- 28. Install in reverse order.
- 29. Position intake camshaft so that cam of the intake camshaft points upward at an angle.
- 30. Position exhaust camshaft so that cam of exhaust camshaft points inward at an angle.
- 31. Tighten to bearing caps to 7 ft. lbs. (10 Nm).
 - 32. Ádjust valve timing.

CRANKSHAFT FRONT SEAL

REMOVAL & INSTALLATION

See Figures 66 through 68.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Remove A/C line from compressor.
 - 3. Remove vibration damper.

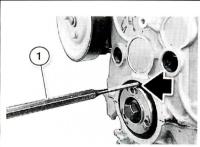
** WARNING

PTFE ring is supplied with a supporting ring. Supporting ring is required as an installation tool. Do not touch inner sealing face of PTFE ring with fingers (risk of damage).

** WARNING

Do not release central bolt. If the central bolt is released, the sprocket wheels of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. The camshafts to the crankshaft can warp (risk of damage).

- 4. Drive PTFE ring inwards with a drift until PTFE ring tilts outwards at bottom. Do not allow PTFE ring to slip inward.
- 5. Secure special tool No. 11 9 601 with screws to crankshaft and tighten to 11 ft. lbs. (15 Nm).



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Fig. 66 Push PTFE ring in until it tilts out at the bottom

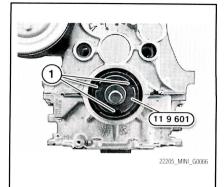


Fig. 67 Install special tool on crankshaft

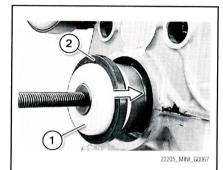


Fig. 68 Push PTFE ring over supporting ring

To install:

- 6. Install in reverse order.
- 7. Apply a light coating of oil to special tool No. 11 9 601.
- 8. Position PTFE ring with supporting ring on special tool No. 11 9 601.
- 9. Push PTFE ring over supporting ring in direction of arrow up to crankcase.
- 10. Remove supporting ring from special tool No. 11 9 601. Supporting ring is no longer needed.
- 11. Draw in PTFE ring with special tool No. 11 9 602 in conjunction with special tool No. 11 9 603 until flush.

CYLINDER HEAD

REMOVAL & INSTALLATION

See Figure 69.

- 1. Before servicing the vehicle, refer to the precautions.
- Fit new cylinder head screws.
- → Do not wash off bolt coating.
- →There must not be any coolant, water or oil present in the pocket holes (risk of corrosion and cracking).
 - 2. Remove exhaust system.
 - 3. Drain coolant.

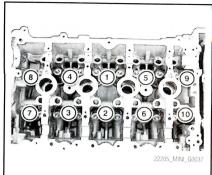


Fig. 69 Cylinder head bolts (illustration shows camshafts removed)

- 4. Drain engine oil.
- 5. Remove exhaust manifold.
- 6. Remove intake air manifold.
- 7. Remove oil dipstick.
- 8. Detach coolant hoses from cylinder head.
 - 9. Remove cylinder head cover.
- 10. Remove inlet and exhaust adjustment unit.
- 11. Secure crankshaft with special tool No. 11 9 590.

→ Remove and install cylinder head in installed state.

12. Suspend engine with engine crane.

→Remove and install cylinder head in installed state.

- 13. Move front panel into assembly position.
- 14. Release upper alternator screws, do not remove alternator.
 - 15. Remove right engine mount.
- 16. Secure special tool No. 11 9 630 with standard bolts.
 - 17. Release bolts.

→If the timing chain is stowed in the gear case, the crankshaft must no longer be rotated. The timing chain may jam on the crankshaft gear.

- 18. Release screw.
- 19. Release cylinder head bolts with special tool No. 11 2 250.
- 20. Release cylinder head bolts from outside inward (10 to 1).
- →Remove shims with a magnet.

Do not use any metal-cutting tools for gasket removal.

- 21. Use special tool No. 11 4 471 to remove coarse gasket remnants from sealing faces of cylinder head and crankcase.
- 22. Remove fine gasket remnants with special tool No. 11 4 472.

- →There must not be any coolant, water or oil present in the pocket holes (risk of corrosion and cracking).
 - 23. Clean all pocket holes.

- 24. Install in reverse order.
- 25. Replace cylinder head gasket.
- Fit new cylinder head screws. Do not wash off bolt coating. Attach shims to cylinder head bolts.

** WARNING

Do not allow shims to drop into engine.

- 26. Secure cylinder head bolts from inside outward (1 to 10), using the following sequence:
 - Step 1: Tighten to 22 ft. lbs. (30 Nm)
 - Step 2: Turn angle 90°
 - Step 3: Turn angle 90°
- 27. Secure bolts, using the following sequence:
 - Step 1: Tighten to 11 ft. lbs. (15 Nm)
 - Step 2: Turn angle 90°
 - Step 3: Turn angle 90°
- 28. Tighten the screw to 22 ft. lbs. (30 Nm).

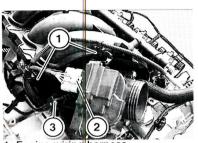
INTAKE MANIFOLD

REMOVAL & INSTALLATION

N 12 Engine

See Figures 70 through 75.

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Remove suction filter housing.
 - 3. Remove engine cover.
- 4. Unfasten engine wiring harness on intake manifold.
 - 5. Disconnect plug connection.
- 6. Disconnect plug connection on tank vent valve.
 - 7. Disconnect plug connection.
 - 8. Release tank vent valve.
- 9. Disconnect plug connection on solenoid valve.
- 10. Release engine breathers and hold to one side.
 - 11. Loosen nut.
 - 12. Disconnect plug connection.
- 13. Unfasten engine wiring harness on intake manifold.
- 14. Release cable at intake manifold holder.
 - 15. Release screws.



- 1. Engine wiring harness
- 2. Plug connection
- 3. Plug connection on tank valve.

Fig. 70 Disconnect wiring harness and plug connections



- 1. Plug connection
- 2. Tank vent valve

22205 MINI G0042

Fig. 71 Disconnect plug connection and tank vent valve



- 1. Plug connection on solenoid valve

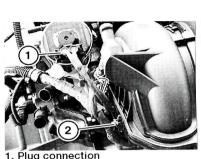
22205_MINI_G0043

Fig. 72 Disconnect plug connection on solenoid valve

- 16. Take off holder.
- 17. Release screw.
- 18. Unscrew nuts.

To install:

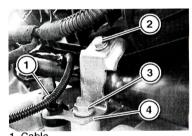
- 19. Install in reverse order.
- 20. Replace all seals.
- 21. Torque the intake manifold to cylinder head to 11 ft. lbs. (15 Nm).



- 1. Plug connection
- 2. Engine wiring harness

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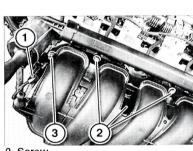
Fig. 73 Unfasten engine wiring harness



- 1. Cable
- 2. 3. Screws
- 4. Holder

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Fig. 74 Release cable, screws, and take off holder



- 2. Screw
- 3. Nuts

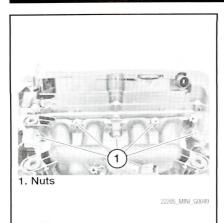
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Fig. 75 Release screw and nuts

N 14 Engine

See Figure 76.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Disconnect the negative battery cable.
 - 3. Remove suction filter housing.
- 4. Disconnect vacuum lines on vacuum connection.



- Fig. 76 Unscrew nuts
- 5. Disconnect plug connection at EPPC.
- 6. Disconnect plug connection on tank vent valve.
- 7. Detach hose from tank vent valve.
 - 8. Unscrew nuts.

- 9. Install in reverse order.
- → OUT connector on EPPC is identified with a green ring, vacuum line is fitted with a green ring (OUT) and vacuum line without green ring (VAC).
 - 10. Replace all seals.
- 11. Torque the intake manifold to cylinder head to 11 ft. lbs. (15 Nm).

OIL PAN

REMOVAL & INSTALLATION

See Figure 77.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Drain engine oil.
- 3. Release oil pan bolts in area of line.

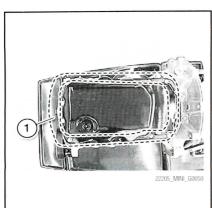


Fig. 77 Oil pan bolts

- 4. Release screw over exhaust manifold with special tools No. 11 9 582 and No. 11 9 581.
- 5. Clean sealing face with special tool No. 11 4 470.
- 6. Remove protruding or surplus sealing beads with a suitable tool.

To install:

- 7. Install in reverse order.
- → A metal substrate gasket is available for repairs. Do not use adhesive sealing bead or liquid seal.
- 8. Tighten oil pan bolts to 9 ft. lbs. 11 Nm).

OIL PUMP

REMOVAL & INSTALLATION

See Figures 78 through 80.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove oil pan.
 - 3. Pull off cover in direction of arrow.
 - 4. Release screw.
 - 5. Grip central bolt to release central bolt.
 - Release screws.



Fig. 78 Pull off cover (1) in direction of arrow.

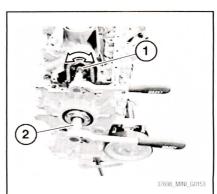
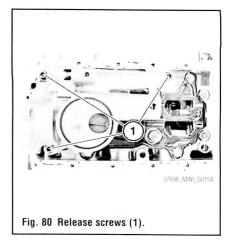


Fig. 79 Grip central bolt (2) to release central bolt (1).



To install:

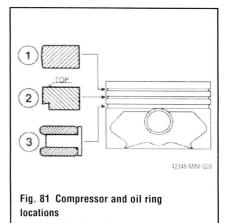
- 7. Install in reverse order.
- 8. Replace cover.
 - Oil pump to bedplate: 19 ft. lbs. (25 Nm)
 - Sprocket to oil pump: 44 inch lbs. (5 Nm) pus an additional 90° rotation

PISTON AND RING

POSITIONING

See Figures 81 and 82.

→Offset position of ring end gaps by 120° from each other, but not above piston pin boss.



REAR MAIN SEAL

REMOVAL & INSTALLATION

See Figure 83.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove transmission.
 - 3. Remove flywheel.
 - 4. Break off PTFE ring with a drift.

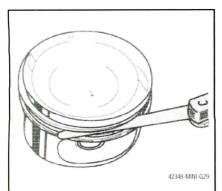


Fig. 82 Showing piston positioning arrow pointing toward front of block

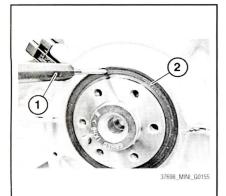


Fig. 83 Brake off PTFE ring (2) with a drift (1)

- 5. Install in reverse order.
- 6. Secure special tool No. 11 9 611 with supplied screws to crankshaft.
- 7. Position PTFE ring with supporting ring on special tool No. 11 9 611.
- 8. Push PTFE ring in direction of arrow over supporting ring onto crankshaft.
 - 9. Attach special tool No. 11 9 612.
- 10. Draw in PTFE ring with special tool No. 11 9 613.
- 11. Screw in special tool No. 11 9 612 up to engine block.

TIMING CHAIN & SPROCKETS

REMOVAL & INSTALLATION

See Figures 84 through 93.

- 1. Before servicing the vehicle, refer to the precautions.
- →Procedure is modified for timing adjustment.
- → The timing is not determined at firing TDC of cylinder No. 1.
- **→**All pistons are in the 90° position.

- 2. Before servicing the vehicle, refer to the precautions section.
 - 3. Remove cylinder head cover.
 - 4. Remove all spark plugs.
 - 5. Remove vibration damper.
 - 6. Remove chain tensioner.
- 7. Remove both VANOS adjustment units.
 - 8. Remove PTFE ring at front.
 - 9. Remove belt tensioner.
- 10. Position crankshaft with special tool No. 11 9 590. Do not remove special tool No. 11 9 590 during repair work. Do not remove special tool No. 11 9 540.
- 11. Fit special tool No. 11 9 280 on hub for vibration damper with screws.

→ You will need another person for gripping when releasing the central bolt.

- 12. Release cen<mark>tr</mark>al bolt in direction of arrow.
 - 13. Release bearing pins.
 - 14. Remove hub towards front.
- 15. Remove chain module with timing chain.
- 16. Using a hook, pull oil pump chain upwards.

To install:

17. Secure chain module with rubber bands to facilitate assembly.

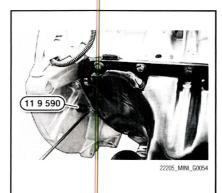
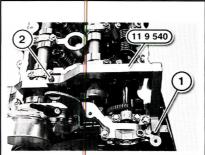


Fig. 84 Special tool No. 11 9 590



22205 MINI G0055

Fig. 85 Special tool No. 11 9 540

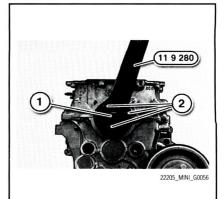


Fig. 86 Install special tool

- 18. Pull timing chain upwards until sprocket wheel rests against chain guide.
- 19. Install timing chain and sprocket wheel in this position.

→Always keep timing chain tensioned; it is possible for timing chain to jam on chain module.

- 20. Attach oil pump sprocket wheel in direction of arrow to crankshaft.
- 21. Insert chain module with timing chain and secure.
 - 22. Attach crankshaft hub.
 - 23. Screw in central bolt. Central bolt

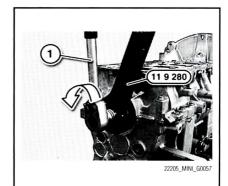


Fig. 87 Release central bolt

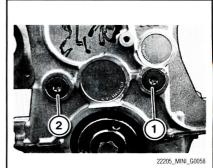
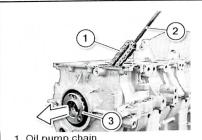


Fig. 88 Bearing pins



- 1. Oil pump chain
- 2. Hook
- 3. Hub



- 1. Timing chain sprocket wheel
- 2. Oil pump sprocket wheel 22205_MINI_G0060

Fig. 90 Sprocket wheels

torque: 37 ft. lbs. (50 Nm), plus torque angle: 100°.

24. Remove special tool No. 11 9 280

2. Timing chain Fig. 91 Chain module assembly

1. Chain module

- 1. Oil pump sprocket wheel
- 2. Timing chain guide rail
- 3. Hub on crankshaft
- 4. Timing chain sprocket wheel

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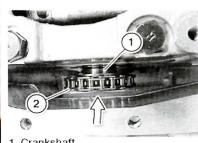
3

3. Rubber bands

4. Sprocket wheel

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Fig. 92 Install position of both sprocket wheels



- 1. Crankshaft
- 2. Oil pump sprocket wheel

22205 MINI_G0063

Fig. 93 Attach oil pump sprocket wheel

- 25. Secure central bolt with special tool No. 00 9 120.
 - 26. Install VANOS adjustment
- 27. Install sprocket wheel for exhaust camshaft.
 - 28. Crank engine twice.
 - 29. Check timing.
 - 30. Install PTFE ring.
 - 31. Assemble engine.

VALVE LASH

ADJUSTMENT

All engines are equipped with hydraulic valve lash adjusters. This design does not permit adjustments nor are adjustments possible.

ENGINE PERFORMANCE & EMISSION CONTROLS

CAMSHAFT POSITION (CMP) **SENSOR**

LOCATION

from hub.

See Figure 94.

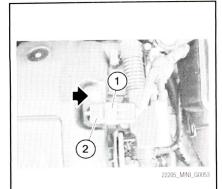


Fig. 94 CMP sensor location

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to precautions.
 - 2. Switch off ignition.
- 3. Read out fault memory of DME control unit.
 - 4. Check stored fault messages.
 - 5. Unlock and remove plug.
- 6. Release screw and camshaft sensor.

To install:

- 7. Install in reverse order.
- 8. Replace sealing ring and coat with antiseize agent.
 - 9. Clear the fault memory.

CRANKSHAFT POSITION (CKP) SENSOR

LOCATION

See Figure 95.

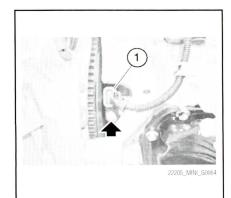


Fig. 95 CKP sensor location

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Switch off ignition.
- 3. Read out fault memory of DME control unit.

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- 4. Remove cover.
- 5. Unlock plug and remove.
- 6. Release screw and remove crankshaft position sensor.
 - 7. Check stored fault messages.

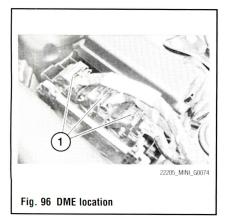
To install:

- 8. Replace sealing ring.
- 9. The remainder of installation is the reverse of removal.
 - 10. Clear the fault memory.

DIGITAL MOTOR ELECTRONIC (DME) CONTROL UNIT

LOCATION

See Figure 96.



REMOVAL & INSTALLATION

See Figure 97.

1. Before servicing the vehicle, refer to precautions.

When replacing the DME/DDE control unit, observe the following: In each case read out the hardware/software status of the relevant control unit using the BMW diagnosis system. Comply with the instructions of the DIS diagnosis system on the steps pertaining to coding and programming. On vehicles with electronic vehicle immobilization, comply with the instructions of the BMW diagnosis system. Each control unit is programmed with certain basic values, which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.

If the DME control unit is without current for a long time (more than one hour), its adaptive system loses the stored values. When a cleared control unit is restarted or a

new control unit is installed, the adaptive system must read in and store the input values of the associated engine as new basic values itself.

This procedure could lead to erratic idling and disturbed overrunning of the engine after starting Depending on the engine it could require some time before all values are adapted to the engine condition. Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit: If possible before exchanging control unit, run engine up to operating temperature. Excharge control units and run the vehicle at alternating engine speeds.

2. Before servicing the vehicle, refer to the precautions section.

** WARNING

Before beginning, always make sure to communicate with the fault memory with a BMW DIS (or equivalent OBD-II scan tool) for existing faults. It may be helpful to print out the results. Once the installation is complete, rerun the scan and correct the remaining faults.

** WARNING

Make sure that all electrical accessories are off and the ignition is switched off.

3. Disconnect the negative battery cable.

** WARNING

Take precautions against electrostatic damage.

- 4. Connect diagnosis system.
- 5. Read fault memory.
- 6. Check stored fault messages.
- 7. Rectify faults.
- 8. Clear fault memory.

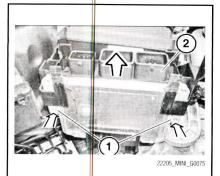


Fig. 97 Removing DME

- 9. Unlock and remove cover
- 10. Unlock plug and remove
 - Press locks in direction of arrow and remove control unit towards top (Locks are accessible through bores)

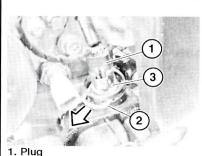
To install:

- 11. Installation is the reverse of removal.
- 12. Check stored fault messages.
- 13. Clear fault memory.

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

LOCATION

See Figure 98.



- 1. Flug
- 2. Lock
- 3. Coolant temperature sensor

22205_MINI_G0068

Fig. 98 ECT location

REMOVAL & INSTALLATION

** WARNING

There is a danger of scalding so only perform this task on an engine that has completely cooled down.

- 1. Before servicing the vehicle, refer to the precautions.
- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.

Coolant can escape when temperature sensor is being replaced. Catch and dispose of coolant.

- 5. Release screw or clamps, as applicable.
- 6. Pull intake muffler towards top and detach clean air pipe.
- 7. Detach intake muffler from air filter housing and remove.
 - 8. Remove clean air pipe.
 - 9. Unlock and detach plugs.
 - 10. Unlock and disconnect line.
- 11. Carefully pull cable duct upwards slightly.

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- 12. Unlock plug and remove.
- 13. Detach lock and remove temperature sensor.

To install:

- 14. Install in reverse order.
- 15. Replace sealing ring.
- 16. If necessary, add coolant.
- 17. Check cooling system for leaks.
- 18. Clear the fault memory.

HEATED OXYGEN (H02S) SENSOR

LOCATION

See Figure 99.

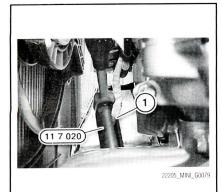


Fig. 99 O2 sensor location

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions section.
 - 2. Read fault memory.
- →If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Sees Compound (refer to BMW Parts Service) to thread.
- →The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.
- 3. Disconnect plug connection for lambda control sensor.
- 4. Release oxygen sensor with special tool No. 11 7 020.

To install:

- 5. Installation is reverse of removal.
- 6. Check function of DME.

KNOCK SENSOR (KS)

LOCATION

See Figure 100.

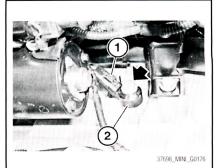


Fig. 100 KS sensor (2) and plug (1) location

REMOVAL & INSTALLATION

1. Before servicing the vehicle, refer to precautions.

** CAUTION

Before beginning, always make sure to communicate with the fault memory with a BMW DIS (or equivalent OBD-II scan tool) for existing faults. It may be helpful to print out the results. Once the installation is complete, rerun the scan and correct the remaining faults.

** CAUTION

Make sure that all electrical accessories are off and the ignition is switched off.

- 2. Remove the intake air manifold and as necessary the exhaust turbocharger.
- 3. Unlock and disconnect the Knock (KS) sensor plug connection.
- 4. Unscrew the KS screw and remove knock sensor.

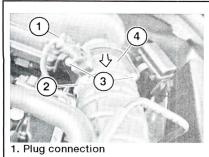
To install:

- 5. Install in reverse order.
- 6. Clean the surface of knock sensors where they contact the engine block.
- 7. Observe the position of the KS in relation to the engine block. It should be positioned at an angle of 20 degrees to the perpendicular of the engine block.
- 8. Replace the KS and knock sensor screw.
- 9. Connect and lock the KS plug connection.
 - 10. Clear the fault memory.

MASS AIR FLOW (MAF) SENSOR (HOT WIRE)

LOCATION

See Figure 101.



- 2. Clamp
- 3. Screws

Fig. 101 MAF location

REMOVAL & INSTALLATION

- 1. Before servicing the vehicle, refer to the precautions.
- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.
 - 5. Disconnect plug connection.
 - 6. Release clamp.
 - 7. Release screws.
- 8. Remove air-mass sensor in direction of arrow.

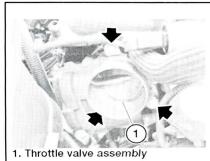
To install:

- 9. Installation is the reverse of removal.
- 10. Check stored fault messages.
- 11. Clear the fault memory.

THROTTLE POSITION SENSOR (TPS)

LOCATION

See Figures 102 and 103.



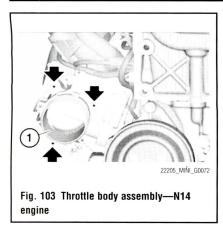
22205 MINI G0071

Fig. 102 Throttle body assembly—N12 engine

REMOVAL & INSTALLATION

N12 Engine

1. Before servicing the vehicle, refer to the precautions section.



2. Read out fault memory of DME control unit.

- 3. Check stored fault messages.
- 4. Switch off ignition.
- 5. Unfasten screws.
- 6. Carefully feed out throttle valve assembly towards top until plug for cable connection is accessible.
 - 7. Unlock connector and remove.
 - 8. Remove throttle valve assembly.

To install:

- 9. Replace sealing ring.
- 10. The remainder of installation is the reverse of removal.
 - 11. Clear the fault memory.

N14 Engine

1. Before servicing the vehicle, refer to the precautions section.

- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.
 - 5. Remove sound generator.
- 6. Release clamps and detach air intake hose.
- Release screws and carefully feed out throttle valve assembly towards top until plug is accessible.
 - 8. Unlock plug and disconnect.
 - 9. Detach cable ties.
 - 10. Remove throttle valve assembly.

To install:

- 11. Install in reverse order.
- 12. Replace sealing ring.
- 13. Clear the fault memory.

FUEL

FUEL SYSTEM SERVICE PRECAUTIONS

Safety is the most important factor when performing not only fuel system maintenance but any type of maintenance. Failure to conduct maintenance and repairs in a safe manner may result in serious personal injury or death. Maintenance and testing of the vehicle's fuel system components can be accomplished safely and effectively by adhering to the following rules and guidelines.

- To avoid the possibility of fire and personal injury, always disconnect the negative battery cable unless the repair or test procedure requires that battery voltage be applied.
- Always relieve the fuel system pressure prior to disconnecting any fuel system component (injector, fuel rail, pressure regulator, etc.), fitting or fuel line connection.
 Exercise extreme caution whenever relieving fuel system pressure to avoid exposing skin, face and eyes to fuel spray. Please be advised that fuel under pressure may penetrate the skin or any part of the body that it contacts.
- Always place a shop towel or cloth around the fitting or connection prior to loosening to absorb any excess fuel due to spillage. Ensure that all fuel spillage (should it occur) is quickly removed from engine surfaces. Ensure that all fuel soaked cloths or towels are deposited into a suitable waste container.
- Always keep a dry chemical (Class B) fire extinguisher near the work area.
- Do not allow fuel spray or fuel vapors to come into contact with a spark or open flame.

GASOLINE FUEL INJECTION SYSTEM

- Always use a pack-up wrench when loosening and tightening fuel line connection fittings. This will prevent unnecessary stress and torsion to fuel line piping.
- Always replace worn fuel fitting Orings with new Do not substitute fuel hose or equivalent where fuel pipe is installed.

Before servicing the vehicle, make sure to also refer to the precautions in the beginning of this section as well.

RELIEVING FUEL SYSTEM PRESSURE

See Figure 104.

- 1. Install special tool, 13-5-220.
- 2. Fit a suitable length of hose onto the special tool and route the hose into a fuel container.
- 3. Screw in check valve (1) of the special tool to release the fuel pressure from the injector rail.
- 4. Hold an absorbent cloth around the special tool and remove the hose and tool.



Fig. 104 Using special tool to relieve fuel rail pressure

** WARNING

Other parts of the fuel system may have some residual pressure. Always open fittings slowly and be prepared to catch any fuel.

FUEL FILTER

REMOVAL & INSTALLATION

See Figures 105 through 108.

- 1. Before servicing the vehicle, refer to the precautions.
- 2. Remove fuel filter with fuel level sensor.
 - 3. Disconnect lines.
 - 4. Release line from hooks.
- 5. Release retaining hook and pull off sensor in downward direction.
- Release cap on fuel filter housing by one turn counterclockwise (bayonet lock).
 - 7. Pull off cap towards top.

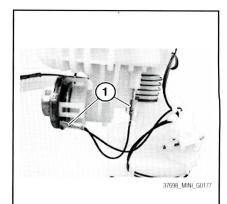


Fig. 105 Disconnect lines (1)

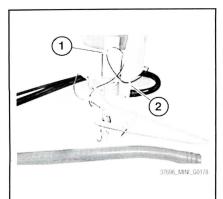


Fig. 106 Release line from hooks (1) and (2).

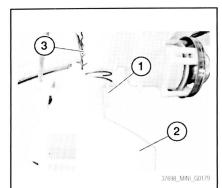


Fig. 107 Release retaining hook (1) and pull off sensor (2) in downward direction. Pay attention to fitting of spring (3)

8. Pull off fuel filter towards top. If necessary, twist fuel filter in so doing.

To install:

- 9. Install in the reverse order.
- 10. Clean inside of fuel filter housing.
- 11. Replace sealing rings.
- 12. Pay attention to fitting of spring.

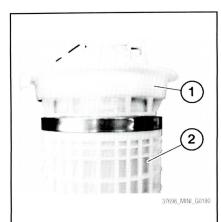


Fig. 108 Release cap (1) on fuel filter housing (2) by one turn counterclockwise (bayonet lock).

FUEL PUMP MODULE

REMOVAL & INSTALLATION

See Figures 109 through 112.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Draw off fuel from fuel tank.
 - 3. Remove rear seat.
 - 4. Push trim panel forward.
 - 5. Disconnect plug connection.
- 6. Release screw cap with special tool 16 1 020.
 - 7. Raise unit.
- 8. To improve installation, secure cable and lines with cord.
 - 9. Disconnect plug connection.
- 10. Unlock line at quick-release fastener and detach.
 - 11. Unclip line.
- 12. Carefully lift fuel pump with fuel level sensor out of fuel tank. Replace rubber seal.

To install:

- 13. Install in the reverse order.
- 14. Tighten bolts/nuts to specification as follows:

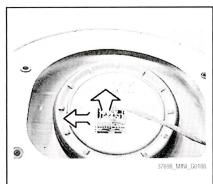


Fig. 109 Disconnect plug connection (arrows)



Fig. 110 Release screw cap with special tool 16 1 020

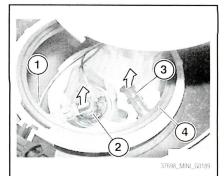


Fig. 111 Secure cable (1) and lines (2 and 3) with cord and replace rubber seal (4)

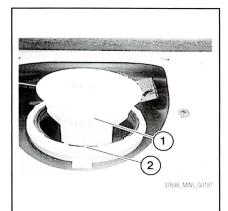


Fig. 112 When installing fuel filter, make sure lug engages in recess on tank

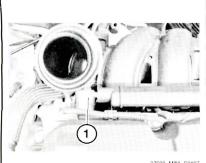
- Service cover to body: 53 inch lbs. (39 Nm)
- Locking ring (metal): 33 ft. lbs. (45 Nm)
- 15. Replace rubber seal.
- 16. When installing fuel filter, make sure lug engages in recess on tank.

FUEL RAIL AND INJECTOR

REMOVAL & INSTALLATION

See Figures 113 and 114.

- 1. Before servicing the vehicle, refer to the precautions.
- 2. Read out fault memory of DME control unit.
 - 3. Switch off ignition.
 - 4. Remove intake filter housing.
- 5. Fuel escapes when fuel line is detached. Catch and dispose of escaping fuel..
- 6. Remove protective cap from compressed air valve.
- 7. Connect compressed air line to compressed air valve.
- 8. Blow fuel back into tank with a short blast of compressed air (max. 3 bar).



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Fig. 113 Remove protective cap (1) from compressed air valve

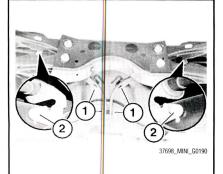


Fig. 115 Disengage parking brake Bowden cables from holders (1) and feed out through rear axle carrier

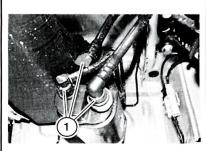


Fig. 118 Unlock quick-release fasteners (1) on carbon canister and detach

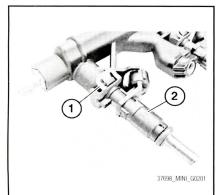


Fig. 114 Lever out retainers (1) and remove fuel injectors (2)

- 9. Unlock and detach fuel line.
- 10. Seal off fuel line with special tool 13 5 281.
 - 11. Release bolts.
 - 12. Detach fuel rail from cylinder head.
 - 13. Unlock plug and remove.
 - 14. Remove fuel rail.
 - 15. Lever out retainers.
- 16. Pull fuel injectors out of injection pipe.

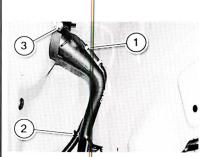
- 17. Install in reverse order.
- 18. Replace sealing rings on fuel injectors and coat with anti-friction rubber coating.
- 19. Tighten bolts/nuts to specification as follows:
 - Injection pipe to cylinder head (N12): 71 inch lbs. (8 Nm)
 - Injection pipe to cylinder head (N14): 14 ft. lbs. (19 Nm)

FUEL TANK

REMOVAL & INSTALLATION

See Figures 115 through 120.

1. Before servicing the vehicle, refer to the precautions.



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Fig. 116 Release hose clamp (1) and disengage filler vent line from holder (2)

- 2. Disconnect the negative battery cable.
- 3. Drain the fuel tank.
 - 4. Remove the muffler.
 - 5. Remove the exhaust heat shield.
- 6. Remove the rear storage compartment bracket.
 - 7. Remove the parking brake cables.
 - 8. Remove the rear seat.
 - 9. Remove trim panels.
 - 10. Remove the left wheel arch trim.

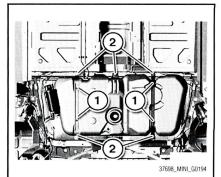
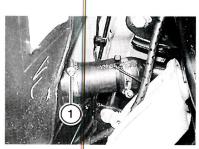


Fig. 119 Remove expansion rivets (1). Release screws (2) and lower fuel tank a

- 11. Disconnect the fuel level sensor and wiring harness.
 - 12. Remove the fuel tank filler hose.
- 13. Remove the vent hose from the fuel filler pipe.
- 14. Release hose clamp and remove filler hose from fuel tank.
- 15. Unlock quick-release fasteners on carbon canister and detach.
- 16. Remove expansion rivets. Release screws and lower fuel tank a little.



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Fig. 117 Release hose clamp (1) and remove filler hose from fuel tank

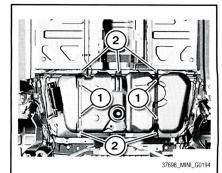


Fig. 120 Disconnect plug connection (1). Unlock quick-release fastener (2) and detach fuel feed line.

- 17. Disconnect plug connection. Unlock quick-release fastener and detach fuel feed line.
 - 18. Remove the fuel tank.
- 19. Pass filler vent line through body and slowly lower fuel tank.

- 20. Install in reverse order.
- 21. Tighten tank to rear axle carrier and body to 14 ft. lbs. (19 Nm).
- 22. Make sure that quick-release fastener is correctly engaged.
- 23. Make sure lines and wiring harness are not trapped or crushed during installation

IDLE SPEED

ADJUSTMENT

Idle speed is controlled by the Electronic Control Module (ECM), and cannot be adjusted.

THROTTLE BODY

REMOVAL & INSTALLATION

N12 Engine

See Figure 121.

- 1. Before servicing the vehicle, refer to the precautions section.
- 2. Read out fault memory of DME control unit
 - 3. Check stored fault messages.

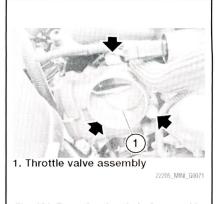


Fig. 121 Removing throttle body assembly

- 4. Switch off ignition.
- 5. Unfasten screws.
- Carefully feed out throttle valve assembly towards top until plug for cable connection is accessible.
 - 7. Unlock connector and remove.
 - 8. Remove throttle valve assembly.

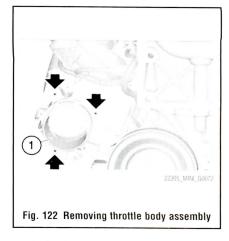
To install:

- 9. Replace sealing ring.
- 10. The remainder of installation is the reverse of removal.
 - 11. Clear the fault memory.

N14 Engine

See Figure 122.

1. Before servicing the vehicle, refer to the precautions section.



- 2. Read out fault memory of DME control unit.
 - 3. Check stored fault messages.
 - 4. Switch off ignition.
 - 5. Remove sound generator.
- 6. Release clamps and detach air intake hose.
- 7. Release screws and carefully feed out throttle valve assembly towards top until plug is accessible.
 - 8. Unlock plug and disconnect.
 - 9. Detach cable ties.
 - 10. Remove throttle valve assembly.

To install:

- 11. Install in reverse order.
- 12. Replace sealing ring.
- 13. Clear the fault memory.

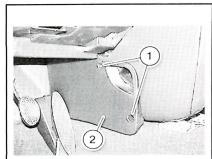
HEATING & AIR CONDITIONING COMPONENTS

BLOWER MOTOR

REMOVAL & INSTALLATION

See Figures 123 and 124.

1. Before servicing the vehicle, refer to the precautions.



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Fig. 123 Release screws (1) and remove cover (2).

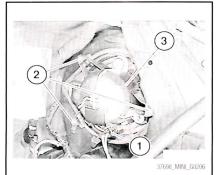


Fig. 124 Disconnect plug connection (1). Release screws (2) and feed out blower (3)

- 2. Remove trim for instrument panel at bottom left (driver's side).
 - 3. Release screws and remove cover.
 - 4. Disconnect plug connection.
- 5. Release screws and feed out blower.

To install:

6. Install in the reverse order.

HEATER CORE

REMOVAL & INSTALLATION

See Figures 125 through 128.

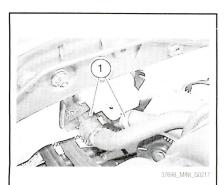


Fig. 125 Unlock and detach coolant lines (1)

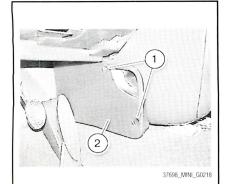
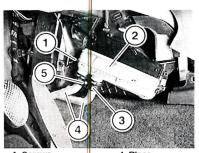


Fig. 126 Release screws (1) and feed out cover (2) towards bottom

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove intake filter housing.
 - 3. Unlock and detach coolant lines.
- 4. Carefully blow through twin pipes to remove remaining coolant from heater core.
- 5. Remove trim for instrument panel at bottom left.
- 6. Release screws and feed out cover towards bottom.
 - 7. Release screws and pull out



- 1. Screws 2. Heater core
- 4. Pipes 5. Screw

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Fig. 127 Carefully disconnect and pull out heater core

heater core approximately 0.39 in (10 mm).

- 8. Release screw.
- 9. Unclip holder and remove.
- 10. Carefully pull twin pipes out of heater core and if necessary catch escaping coolant.
 - 11. Carefully pull out heater core.

To install:

- 12. Install in the reverse order.
- 13. Fins of heater core must not be damaged.

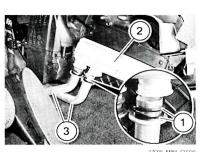


Fig. 128 Replace sealing rings (1) and make sure twin pipes (3) are correctly seated on heater core (2)

- 14. Make sure heater core is correctly seated.
 - 15. Replace sealing rings.
- 16. Use special tool 00 9 030 to fit sealing rings without damaging them.
- 17. Make sure twin pipes are correctly seated on heater core.
- 18. Make sure coolant lines are correctly seated
- 19. Vent cooling system and check for leaks.

STEERING

POWER RACK & PINION STEERING GEAR

REMOVAL & INSTALLATION

See Figure 129.

- 1. Before servicing the vehicle, refer to the precautions section.
- →These vehicles are fitted with electronic power steering and do not use the typical hydraulic fluid and pump.

** WARNING

Steering gear: Check connection of steering gear for corrosion, clean contacts if necessary. The steering gear must be replaced if the corrosion is too far advanced.

** WARNING

Connecting cable: In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting cable. If the insulation reveals any noticeable/striking features, it will be necessary to replace the part. Otherwise

it will be sufficient to replace the contacts or plug housing.

- 2. Disconnect the negative battery cable.
- 3. Remove both tie rod ends from swivel bearing.
- 4. Replacement: Remove both tie rod ends from steering gear.
 - 5. Lower front axle support.
 - 6. Release screws.

** WARNING

Do not allow the control head of the steering gear to strike other compo-

nents. This may result in damage to the steering gear.

7. First swing steering gear in direction of travel to right and then remove towards front.

To install:

- →For replacement: On cars with 18" tires, it will be necessary to replace steering stop limiters.
- **→**Deformation elements must point to steering gear.

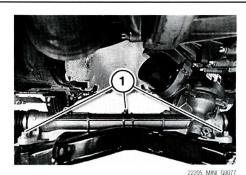


Fig. 129 Electronic power steering

- 8. The remainder of installation is the reverse of removal.
- 9. After installation, check alignment.
- 10. For replacement: Carry out programming/coding.
 - 11. For models with Dynamic Stability

Control (DSC): Carry out steering angle sensor adjustment.

→Only cars with DSC are fitted with a steering angle sensor (integrated in the steering column switch cluster).

POWER STEERING PUMP

REMOVAL & INSTALLATION

→ These vehicles are fitted with electronic power steering and do not use the typical hydraulic fluid and pump.

SUSPENSION

LOWER BALL JOINT

REMOVAL & INSTALLATION

The lower ball joint is an integral part of the lower control arm assembly.

LOWER CONTROL ARM

REMOVAL & INSTALLATION

See Figures 130 through 133.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove front wheel.
- On vehicles equipped with Dynamic Stability Control, release screw on left side at ride-height sensor and remove bracket from control arm.
 - 4. Unfasten nut.
- 5. Press control arm off swivel bearing with special tool 31 2 310.
 - 6. Unscrew nuts.
- 7. Screw special tool 31 1 040 onto joint.
- 8. Strike joint from below to release it from taper in front axle carrier.
 - 9. Lower front axle support.
- 10. Remove stabilizer from front axle carrier and tie up.

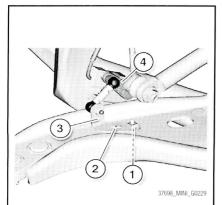


Fig. 130 Release screw (1) and remove bracket (3) from control arm. Sensor lever (4) must point from ride-height sensor to left front wheel. Align bracket (3) by way of lug (2) to corresponding opening in control arm

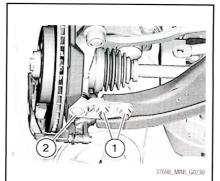


Fig. 131 Unscrew nuts (1). Keep wheel control joint (2) to control arm

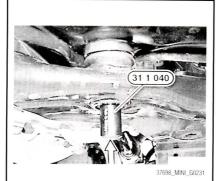


Fig. 132 Screw special tool 31 1 040 onto joint. Strike joint from below to release it from taper in front axle carrier

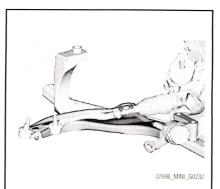


Fig. 133 Remove control arm with bracket from front axle carrier

11. Remove control arm with bracket from front axle carrier.

FRONT SUSPENSION

To install:

- 12. Install in the reverse order.
- 13. Tighten bolts/nuts to specification as follows:
 - Wheel guide joint to control arm: 129.5 ft. lbs. (175 Nm)
 - Wheel guide joint to swivel bearing: 52 ft. lbs. (70 Nm) plus an additional 90° rotation
 - Ball joint to front axle carrier: 52 ft. lbs. (70 Nm) plus an additional 90° rotation
 - Bracket to control arm: 53 inch lbs. (6 Nm)
 - 14. Replace self-locking nuts.
- 15. Sensor lever must point from rideheight sensor to left front wheel.
- 16. Align bracket by way of lug to corresponding opening in control arm.
- 17. Keep wheel guide joint to swivel bearing connection clean and free from oil and grease.
- 18. Keep wheel control joint to control arm connection clean and free from oil and grease.
- 19. Keep control arm to front axle carrier connection clean and free from oil and grease.
- 20. On vehicles equipped with Dynamic Stability Control, carry out steering angle sensor adjustment.

MACPHERSON STRUT

REMOVAL & INSTALLATION

See Figures 134 through 136.

- 1. Before servicing the vehicle, refer to the precautions.
- 2. If the centering pin is missing from the support bearing, the position of the studs to the wheel arch must be parked so that the original camber is approximately maintained.
- 3. Only one nut may ever be released for marking.
 - 4. Remove front wheel.
- 5. Remove tie rod end from swivel bearing.
- 6. Remove stabilizer link from spring strut.

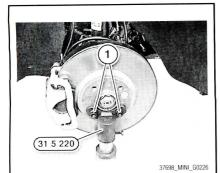


Fig. 134 Secure special tool 31 5 220 with wheel bolts (1) to wheel bearing and support swivel bearing with workshop jack

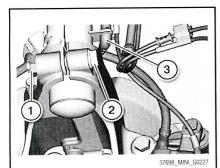


Fig. 135 Disengage pulse generator (3) from spring strut. Release nut (1) and remove screw (2)

- 7. Disengage brake hose from spring strut.
- 8. Secure special tool 31 5 220 with wheel bolts to wheel bearing and support swivel bearing with workshop jack.
- 9. Disengage pulse generator from spring strut.
 - 10. Release nut and remove screw.
- 11. Carefully lower workshop jack until spring strut can be removed.
- 12. Secure spring strut against falling out.
 - 13. Unscrew nuts.
- 14. Remove spring strut downwards out of wheel arch.

- 15. Install in the reverse order.
- 16. Tighten bolts/nuts to specification as follows:
 - Spring strut support bearing to body: 25 ft. lbs. (34 Nm)
 - Spring strut shock absorber to pivot mount: 74 ft. lbs. (100 Nm)
- 17. Keep press fit of swivel gearing and spring strut in lower area clean and free from oil and grease.
 - Replace self-locking nuts.

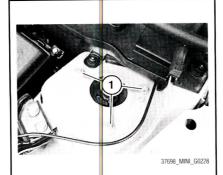


Fig. 136 Unscrew nuts (1)

- 19. Tightening permitted by means of screw only.
- 20. Centering pin missing: Make position of studs in relation to wheel arch.
- 21. Clean contact surface in spring strut dome.
- 22. Align spring pin to bore in wheel arch or studs to markings on wheel arch.
 - 23. Replace self-locking nuts.
- 24. Carry out wheel alignment check if a spring strut with support bearing was or has been installed without centering pin.

OVERHAUL

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove front spring strut.
- 3. Clamp special tool 31 3 341 with guide in vice.
- 4. Fit special tools 31 3 351 from above on special tool 31 3 341 until locking pins can be felt and head to snap into place.
- 5. Check seating of special tools 31 3 351, correct if necessary.
- 6. Coils of coil spring must be located completely in recesses of special tools 31 3 351 when tensioned!.
- 7. Compress coil spring until stress on piston rod is relieved.
- 8. Clean coil spring to remove all coarse dirt and mount on special tools 31 3 351.
- 9. Turn spring strut until end of coil spring points upwards.
- 10. Compress coil spring until stress on piston rod is relieved.
- 11. Nut may only be released when the upper and lower coils of the coil spring are located completely in the recess of the spring holder!.
 - 12. Take off cap
- 13. Release nut with special tool 31 2 210; if necessary, crip piston rod with wrench.
- 14. Remove support bearing, shim and upper spring cup.

- 15. Remove spring strut with auxiliary damper and protective tube sideways from tensioned coil spring.
- 16. Remove auxiliary damper with protective tube and lower spring pad from shock absorber.

To install:.

- 17. Check auxiliary damper, protective tube and lower spring pad for damage, replace if necessary.
- 18. Attach lower spring pad to spring plate.
- 19. Attach auxiliary damper with protective tube to piston rod.
- 20. Make sure rubber knob is correctly positioned in spring cup bore.
- 21. Insert spring strut in tensioned coil
- 22. Check upper spring pad for damage, replace if necessary.
- 23. Connect upper spring cup, shim and support bearing to piston rod.
- 24. Mount shim and dust sleeve correctly between support bearing and upper spring cup.
- 25. Replace nut, screw onto piston rod and tighten down with special tool 31 2
- 26. Tighten spring strut support bearing to 47 ft. lbs. (64 Nm).
 - 27. Fit cover cap.
- 28. End of coil spring at top must rest on indentation in upper spring cup and spring pad.
- 29. Check installation position of protective tube, correct if necessary.
- 30. End of lower coil spring must rest on stop of spring pad.
- 31. Align all components correctly to each other and relive tension on coil spring.
- 32. Carry out wheel alignment check if a spring strut with support bearing was or has been installed without centering pin.

STEERING KNUCKLE

REMOVAL & INSTALLATION

See Figures 137 and 138.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove front wheel..
- 3. Expand turning lock sufficiently to avoid damaging thread when releasing collar nut
- 4. Release collar nut, press brake pedal to floor for this purpose..
 - 5. Remove brake disc..
- 6. Remove pulse generator from swivel bearing and expose line up to engine carrier.

9. Tighten bolts/nuts to specification as

Stabilizer link to stabilizer: 41 ft.

· Bracket, control arm rubber mount

to front axle carrier: 122 ft. lbs.

10. On vehicles with Dynamic Stability

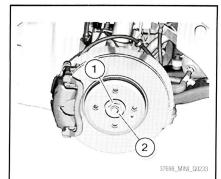


Fig. 137 Release collar nut (1), press brake pedal to floor for this purpose. Secure collar nut on flattened area (2) of drive shaft by positive peening

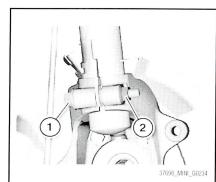


Fig. 138 Slacken nut (2). Pull out screw (1) towards rear and remove swivel bearing

- 7. To avoid damaging the stabilizer link, remove the stabilizer link from the stabilizer.
- 8. Remove tie rod end from swivel bearing..
- 9. Remove wheel guide joint from swivel bearing..
- 10. Press swivel bearing outwards and remove output shaft from wheel bearing..
 - 11. Disengage brake hose from holder..
- 12. Support swivel bearing with workshop jack..
 - 13. Slacken nut...
- 14. Pull out screw towards rear and remove swivel bearing..

To install:

- 15. Install in the reverse order.
- 16. Tighten bolts/nuts to specification as follows:

- Output shaft to angular contact ball bearing: 135 ft. lbs. (182 Nm)
- Spring strut shock absorber to pivot mount: 74 ft. lbs. (100 Nm)
- 17. Tightening to torque must be effected by means of the screw.
 - 18. Note insertion direction of screw..
 - 19. Replace self-locking nuts..
- 20. Replace collar nut, oil collar nut/wheel bearing contact surface only and tighten down...
- 21. No oil permitted on thread of shaft journal or collar nut..
- 22. Secure collar nut on flattened area of drive shaft by positive peening..
- 23. Keep swivel bearing to spring strut connection clean and free from oil and grease..
 - 24. Perform chassis alignment check.

STABILIZER BAR

REMOVAL & INSTALLATION

See Figure 139.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Lower front axle support.
- 3. Release nut; if necessary, grip dihedron or hexagon socket..
 - 4. Release left and right screws...
- 5. Remove stabilizer from control arm bracket..

To install:

- 6. Install in the reverse order.
- 7. Replace self-locking nut.
- 8. Replace rubber mount for stabilizer.

Control, carry out steering angle sensor adjustment.

WHEEL HUB & BEARING

lbs. (56 Nm)

(165 Nm)

REMOVAL & INSTALLATION

(SEALED UNIT)

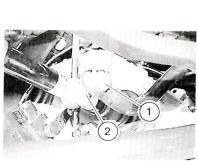
See Figure 140.

follows:

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove front wheel.
- Expand turning lock sufficiently to avoid damaging thread when releasing collar nut.
- 4. Release collar nut, press brake pedal to floor for this purpose.
 - 5. Remove brake disc.
- 6. Remove pulse generator from swivel bearing and expose line up to engine carrier.
- 7. Release screws (1) and remove bearing from output shaft.

To install:

- 8. Replace microencapsulated screws.
- 9. Tighten wheel bearing to swivel bearing: 15 ft. lbs. (20 Nm)



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Fig. 139 Release nut (1); if necessary, grip dihedron (2) or hexagon socket.

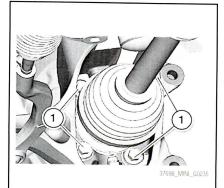


Fig. 140 Release screws (1) and remove bearing from output shaft

SUSPENSION

LOWER CONTROL ARM

REMOVAL & INSTALLATION

See Figures 141 and 142.

- 1. Before servicing the vehicle, refer to the precautions.
 - 2. Remove rear wheel.
- 3. Remove underbody paneling, as necessary.
- 4. Remove cruciform reinforcement on convertible.
 - 5. Lower rear exhaust system.
 - 6. Release sheet nuts and screws.
 - 7. Remove heat shield.
- 8. Mark position of eccentric adjustment washer to trailing arm to simplify subsequent adjustment of rear axle.
 - 9. Release screw and slacken nut.
- 10. Remove screw and then remove control arm.

To install:

- 11. Install in the reverse order.
- 12. Tighten bolts nuts to specification with vehicle at normal ride height:
 - Lower control arm to trailing arm: 74 ft. lbs. (100 Nm)
 - Control arm to rear axle carrier: 74 ft. lbs. (100 Nm)
- 13. Refit eccentric adjustment washer.
 - 14. Replace self-locking nut.
- 15. Tighten bolt connection in normal position.
 - 16. Perform chassis alignment check.

MACPHERSON STRUTS

REMOVAL & INSTALLATION

See Figures 143 and 144.

1. Before servicing the vehicle, refer to the precautions.

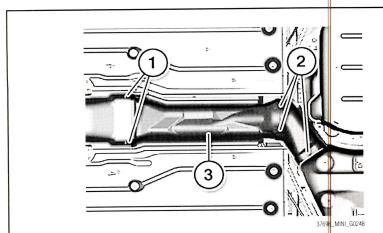


Fig. 141 Release sheet nuts (1), screws (2) and remove heat shield (3)

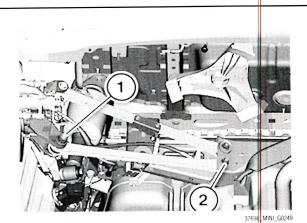


Fig. 142 Release screw (1) and slacken nut (2)

REAR SUSPENSION

- 2. Remove rear wheel.
- 3. Remove lead for pulse generator and brake hose from spring strut.
- 4. Support trailing arm from underneath using a workshop jack.
- 5. Secure spring strut against falling out.
- 6. Release screw and tie up spring strut.
- 7. Release screws and remove spring strut.

To install:

- 8. Install in the reverse order.
- 9. Tighten bolts/nuts to specification as follows:
- 10. Spring strut support bearing to body: 41 ft. lbs. (56 Nm)
- 11. Spring strut shock absorber to trailing arm: 122 ft. lbs. (165 Nm)
 - 12. Replace screws.
- 13. Blow out chips in thread of trailing arm with compressed air (caused by initial screwing with self-tapping screw)
- 14. Make sure rubber grommets are correctly seated.
- 15. Secure upper spring strut in body.
- 16. Align shock absorber to swivel bearing by turning shock absorber.

STABILIZER BAR

REMOVAL & INSTALLATION

See Figures 145 through 146.

- 1. Before servicing the vehicle, refer to the precautions.
- 2. On Cooper, Cooper S and Clubman models remove underbody paneling on left and right.
- 3. On convertible model remove floor plate cruciform reinforcement.
- On convertible model, remove rear left and right spring strut shock absorbers.
- 5. Release nut on left and right; if necessary.
- 6. Grip hexagon socket or dihedron.
- 7. Disengage exhaust rubber at rear.
- 8. Release screws and nuts.
- 9. Remove heat shield in rear area from body.
- 10. Remove brake line from holders. Brake line is located on right side of floor plate in front of tank.
- 11. Support rear axle support with special tools 31 5 250, 31 5 252 and 31 5 253.
 - 12. Release screws on left and right.